

**OU4 SOLAR EVAPORATION POND  
INTERIM MEASURES/INTERIM REMEDIAL ACTION**

**DRAFT RESPONSIVENESS SUMMARY**

U.S. Department of Energy  
Rocky Flats Environmental Technology Site  
Golden, Colorado

June 1995

**ADMIN RECORD**

DOCUMENT CLASSIFICATION  
REVIEW WAFER PER  
CLASSIFICATION OFFICE

**INTRODUCTION . . . . . 1**

## I.1 GENERAL COMMENTS ..... 6

I.1.1	DOE CREDIBILITY	6
I.1.2	PUBLIC INVOLVEMENT	8
I.1.3	NEED FOR REMEDIATION	10
I.1.4	CONSIDERATION OF OTHER ALTERNATIVES	12
I.1.4.1	Alternative Identification and Evaluation Criteria	13
I.1.4.2	National/State-of-the-Art Solution	15
I.1.4.3	Concrete Cubicles	16
I.1.4.4	Onsite Aboveground Storage	17
I.1.4.5	Total/Complete Cleanup of OU4	19
I.1.4.6	Centralized Onsite Landfill	20
I.1.4.7	Hot Spot Remediation	20
I.1.5	ENVIRONMENTAL IMPACT STATEMENT	22
I.1.6	PROTECTIVENESS OF PROPOSED REMEDY	23
I.1.6.1	Protection of Human Health, Worker Safety, Wildlife, and the Environment	24
I.1.6.2	Potential for Leakage	26
I.1.6.3	Long-term Effects, Goals, and Costs	28
I.1.6.4	Long-term Monitoring	29
I.1.7	PONDCRETE AND SLUDGE MANAGEMENT	31

I.2	SPECIFIC COMMENTS AND DOE RESPONSES . . . . .	32
I.2.1	SPECIFIC COMMENTS CONCERNING RISK ASSESSMENT . . . . .	33
I.2.2	SPECIFIC COMMENTS CONCERNING GROUNDWATER REMEDiation . . . . .	41
I.2.3	SPECIFIC COMMENTS CONCERNING THE DESIGN AND CONSTRUCTION OF THE PROPOSED IM/IRA . . . . .	46
I.2.4	SPECIFIC COMMENTS CONCERNING THE POST-CLOSURE MONITORING SYSTEM . . . . .	50
I.2.5	SPECIFIC COMMENTS CONCERNING POTENTIAL FAILURES OF THE CLOSURE SYSTEM . . . . .	53
I.2.6	MISCELLANEOUS SPECIFIC COMMENTS . . . . .	56

PART II      REGULATORY AGENCY COMMENTS AND DOE RESPONSES

II.1	COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT .	62
II.1.1	GENERAL COMMENTS . . . . .	62
II.1.2	SPECIFIC COMMENTS . . . . .	63
II.2	U.S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS . . . . .	81
II.2.1	CRITICAL COMMENTS . . . . .	81
II.2.2	GENERAL COMMENTS . . . . .	82
II.2.3	SPECIFIC COMMENTS . . . . .	88

APPENDIX A      Public Comments

LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CAB	Citizens Advisory Board
CAMU	Corrective Action Management Unit
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHWA	Colorado Hazardous Waste Act
COC	Constituent of Concern
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EA	Environmental Assessment
EIS	Environmental Impact Statement
FONSI	Finding of No Significant Impact
GRA	General Response Action
HELP	Hydrologic Evaluation of Landfill Performance Model
IAG	Interagency Agreement
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
ITS	Interceptor Trench System
LDR	Land Disposal Restriction
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
OU	Operable Unit
PAD	Protected Area Decontamination
PCOC	Potential Constituent of Concern
PRG	Preliminary Remediation Goal
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
Rocky Flats	Rocky Flats Environmental Technology Site (RFETS)
Ponds	Solar Evaporation Pond (SEP)
SEP	Solar Evaporation Pond
TU	Temporary Unit
WAC	Waste Acceptance Criteria

## INTRODUCTION

On February 10, 1995, DOE issued the Rocky Flats Operable Unit No. 4 (OU4) Interim Measure/Interim Remedial Action - Environmental Assessment (IM/IRA-EA) Decision Document for public review and comment as required by the Interagency Agreement and Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The contents of the IM/IRA-EA Decision Document are described below. The public comment period commenced on February 13, 1995 and terminated on April 11, 1995. The U.S. Department of Energy (DOE) took a proactive approach to involve stakeholders to ensure that opportunities for information sharing and public involvement were available to the local communities and interested parties prior to and during the public comment period for the OU4 IM/IRA-EA Decision Document. DOE initiated the following forums and opportunities for public involvement.

- Public meetings,
- Public workshop, and
- OU4 site tours.

In addition, the DOE worked closely with the Citizens Advisory Board, and briefed local, county, and national politicians with respect to the plan. The DOE also offered to speak to local citizens groups.

This document contains the DOE's responses to comments received from the public and the regulatory agencies, and provides information regarding the closure of the Solar Evaporation Ponds (Ponds) and the remediation of contaminated soil associated with OU4. The OU4 IM/IRA is considered to be a high priority project to reduce the overall risk at Rocky Flats.

In summary, the IM/IRA-EA Decision Document contains the following information:

- Background information regarding the operational history of the Ponds and the closure/remediation process (Part I);
- Characterization results for the Ponds and surrounding soils (Part II);
- Identification of the constituents of concern, calculation of preliminary remediation goals, and development and evaluation of remedial alternatives that would meet the closure/remediation goals (Part III);
- Design, implementation, and impacts of the proposed IM/IRA (Part IV);

- Post-closure monitoring and maintenance activities (Part V); and
- Numerous appendices containing supporting documentation.

The DOE evaluated a broad range of general response actions and selected in-place closure to close and remediate the Ponds. The selected general response action includes excavating subsurface soils beneath the Ponds and installing a subsurface drain. The excavated soils will be blended with the Pond contents (liners, sludge, and pondcrete), and placed above the subsurface drain. Contaminated OU4 surface soils from the vicinity of the Ponds will also be consolidated above the subsurface drain. An engineered cover designed for a 1,000-year period of performance will be constructed over the consolidated contaminated materials. The proposed engineered cover and subsurface drain will prevent human and environmental receptors from contacting the contaminated materials, and will minimize the amount of precipitation that can percolate to the groundwater. The engineered cover will have a state-of-the-art monitoring system to ensure that the cover is functioning as required. Clean soils will be used to reclaim the excavated areas beyond the engineered cover, and will be seeded to re-establish the native habitat.

The proposed IM/IRA is protective of human health and the environment, meets all applicable or relevant and appropriate requirements, is effective over the longterm, can be implemented in accordance with the Interagency Agreement schedule, and is fiscally responsible. Engineered covers are common throughout the country for the closing surface impoundments. The design of the engineered cover proposed for the OU4 Ponds is based on 8 years research at the DOE's Hanford Site in Washington, and has been tailored to the conditions at Rocky Flats. The proposed IM/IRA is considered to be a permanent remediation solution.

The intent of the public review and comment period was to solicit public input regarding the selected closure/remedial alternative for the OU4 IM/IRA. The public comments were evaluated along with those received from the regulatory agencies to incorporate required changes and to correct technical and regulatory deficiencies. The comments were also used to gauge public acceptance of the proposed IM/IRA. According to CERCLA regulations, public support or opposition is considered to be a modifying criterion for evaluating the identified remedial alternatives. Although this criterion does not need to be specifically included in ranking the remedial alternatives, public comments can be used to modify the selected remedial alternative or to justify selection of another alternative.

This Responsiveness Summary addresses the public comments received during the public comment period (Part I of this document) and the comments received from the regulatory agencies (Part II of this document). The numerous public comments received by the DOE are contained in Appendix A. Comments were received from concerned citizens, the Citizens

Advisory Board, Physicians for Social Responsibility, and the Rocky Mountain Peace Center. Some of these organizations distributed additional information to encourage their membership and the surrounding community to submit comments. This solicitation may have resulted in a number of similar public comments. For example, DOE received several public comments encouraging selection of a different alternative such as delaying remediation, aboveground storage, offsite disposal, and an onsite centralized landfill. Many other commentors did not identify a specific preference, but encouraged DOE to "clean it up right."

After considering all of the public and regulatory agency comments, DOE considers that in-place closure of the SEPs as presented in the IM/IRA-EA Decision Document is the most cost-effective solution that meets regulatory requirements while providing protection for public health and the environment. This conclusion is based on the fact that the contaminated OU4 materials with low levels of radioactivity and hazardous substances can be safely dispositioned onsite via the proposed IM/IRA. The DOE, Colorado Department of Public Health and Environment (CDPHE), and U.S. Environmental Protection Agency (EPA) agree that closure in-place is a regulatorily acceptable method for closing surface impoundments. Precedents have been set by several sites in Colorado where in-place closures have been implemented. Implementation of the other alternatives cannot be justified when considering the limited benefits from reducing environmental risks versus the increase in costs and potential hazards to remediation workers. The specific reasons for eliminating alternatives recommended by the public are contained in Section I.1.3 of this Responsiveness Summary.

However, the selected IM/IRA will be modified in response to several public and regulatory agency comments. In general, these major modifications will include:

- A discussion will be added to the IM/IRA-EA Decision Document addressing the relationships between the Phase I action to close the Ponds and remediate the soils, and the Phase II program to evaluate and remediate groundwater. The IM/IRA-EA Decision Document will be modified to describe how the closure action (Phase I) will not impact potential groundwater corrective actions (Phase II).
- Part IV (Section IV.3.1.5) of the IM/IRA-EA Decision Document will more fully describe why the subsurface drain system was selected over a liner system.
- The DOE is planning a field investigation in the vicinity of the OU4 Solar Evaporation Ponds to identify the existence of "inferred" faults. DOE will re-examine the hillside stability modeling upon completion of that investigation.

- The IM/IRA-EA Decision Document will be modified to include a discussion of potential failures, and the engineering controls designed to prevent or mitigate a failure.
- The Executive Summary of the IM/IRA-EA Decision Document will be re-written to address the general public as well as scientists and engineers.
- The processing of sludge and pondcrete will be modified to ensure compliance with 6 CCR 1007-3, 264, Subpart X requirements (instead of being considered a temporary unit).
- Part IV of the IM/IRA-EA Decision Document will be modified to provide additional details with respect to the proposed air monitoring system.



**PART I  
PUBLIC COMMENTS AND DOE RESPONSES**

## I.1 GENERAL COMMENTS

A majority of the public comments raised similar concerns and questions. Instead of responding to each comment individually, which would substantially increase the size and tediousness of the Responsiveness Summary, similar comments are grouped under common topics and a response is provided to the overall concerns and issues associated with each topic. All of the public comments received are provided in Appendix A. Some of these comments are paraphrased here to capture the essence of the concern or issue. The general comment topics include:

- DOE Credibility,
- Public Involvement,
- Need for Remediation,
- Consideration of Other Alternatives,
- Environmental Impact Statement,
- Protectiveness of the Proposed Remedy, and
- Pondcrete and Sludge Management.

The comments and responses for each of the above general topics are provided in the following sections. Responses to specific technical comments are provided in Section I.1.2 of this Responsiveness Summary.

### I.1.1 DOE CREDIBILITY

#### Issues/

**Comments:** Based on some of the comments received, there seems to be a perception that the DOE is insensitive and has not placed much emphasis on remediating OU4 in a serious and responsible matter. One commentator stated that DOE needs to take full responsibility for the restoration of the environment that it polluted. Another commentator suggested that the environment needs to be respected and encourages DOE to exercise more intelligent and sensitive decisionmaking. Other commentators indicated that they do not trust the DOE to do a good job. Some members of the public feel that DOE refuses to deal with remediation problems responsibly and professionally, ignores public concerns, presents an uncaring attitude, tells whitewash lies, and downplays the situation. One commentator suggested that only the truth will bring solutions; sometimes from unexpected sources. Another commentator reminded DOE that they are accountable to the people and that the job needs to be performed correctly. Although most of the comments addressing this issue indicated a negative perception, one commentator stated that the plan is a good effort and is well thought out.

**Response:** Although DOE recognizes that some public distrust may be the result of past policies which precluded dissemination of information to the public, the perception that DOE has handled the OU4 IM/IRA in an insensitive, irresponsible, unprofessional, and trivial manner is unfounded. This type of behavior would be inconsistent with Secretary of Energy, Hazel O'Leary's, openness initiative for environmental restoration projects to fully disclose all pertinent information. DOE has provided and continues to provide information to the public to allow decisions to be based on scientific evidence rather than on emotion or historical perceptions of the DOE. All the OU4 information used to develop the proposed plan, including reports, meeting minutes, and draft review comments and responses, is readily available to the public through the Administrative Record located in five Denver area reading rooms.

DOE prepared the IM/IRA-EA Decision Document in accordance with its legal obligations under the Interagency Agreement. As the owner of Rocky Flats, a steward of the environment, and a member of the community, DOE accepts full responsibility for environmental remediation. DOE recognizes that it is accountable to Congress as well as to the public. Therefore, the proposed IM/IRA has been developed responsibly, professionally, and honestly to ensure that the public and environment are protected. DOE has frequently met with CDPHE and EPA for the last 2 years to jointly develop the proposed IM/IRA through discussion and resolution of various issues (including environmental, human health, technical, legal/regulatory, funding, and schedule) and public concerns. As required by CERCLA, DOE has also solicited public input on the proposed IM/IRA. This proposed IM/IRA has been extensively reviewed by the EPA, CDPHE, Citizens Advisory Board, Technical Review Group, and independent technical experts to ensure that it is complete, complies with regulatory requirements, protects human health and the environment, is defensible, and represents a fiscally responsible solution. In fact, DOE modified the proposed IM/IRA to address specific concerns and to incorporate recommendations identified by the public and regulatory reviewers.

With the involvement of both the regulatory agencies and the public, DOE believes that it has acted responsibly and in a manner accountable to the community to select the best alternative for remediating OU4.

### I.1.2 PUBLIC INVOLVEMENT

#### Issues/

**Comments:** Several commentors questioned whether the level of public involvement was appropriate. One commentor commended DOE, EPA, and CDPHE for working with the Environmental and Waste Management Committee of the Citizens Advisory Board and the Technical Review Group. However, this commentor also pointed out that effective public involvement means involving the public during the conceptual phase; not to merely "tweak" proposals. The commentor also indicated that public input is necessary to make rational, publicly acceptable decisions on cleanup and waste management issues such as "What should happen with waste at Rocky Flats?" and "How clean is clean?" Another commentor also stated that public involvement in the IM/IRA process should be as early as possible. Otherwise, the information will be too limited to make a decision that is technically sound and publicly acceptable. Another commentor recommended that a citizens task force be formed to advise the DOE on a better solution, since it is the citizens' health that is at stake. Finally, several commentors suggested that more hearings are required prior to making a final decision.

**Response:** DOE took a proactive approach to involve stakeholders to ensure that opportunities for information sharing and public involvement were available to the local communities and interested parties prior to and during the required public comment period for the OU4 IM/IRA-EA Decision Document. This public involvement program was implemented to meet the following objectives:

- Meet EPA, CDPHE, DOE, and EG&G (the Rocky Flats contractor) commitments for public involvement and information sharing, both in the conceptual phase and in the decisionmaking phase;
- Provide information to the public about the proposed OU4 closure process and supporting documentation; and
- Invite public participation in the decision-making process.

Community groups and individuals had various opportunities to learn about the OU4 activities and provide feedback to the DOE. All of the public meetings and tours were announced in local newspapers to ensure that interested parties had an opportunity to participate. In addition to the public meetings and site tours, DOE offered to speak to local citizens groups about the proposed IM/IRA; however,

no citizens group invited DOE to speak. In order to make the technical information understandable, the following tools were developed:

**Exhibit and Supporting Materials** - Exhibits were developed for use in the January 1995 workshop, other public meetings, and the site visitors center. The exhibits included the following:

- Pictorial and brief written explanation of the Solar Evaporation Ponds past and present,
- Pictorial diagrams of proposed solutions and post-closure monitoring,
- Actual monitoring equipment, and
- Samples of the low-permeability rubberized asphalt proposed as one layer of the engineered cover.

**Meetings and Briefings** - In addition to the information publicly available in the administrative record, DOE conducted the following activities to inform the public of the details associated with the development of the OU4 IM/IRA and to obtain the public's input.

- The DOE conducted public meetings from March 23, 1994 through March 22, 1995. Although DOE modified the IM/IRA-EA Decision Document in response to questions and comments presented at public meetings, the public did not express any significant opposition to the alternatives, including onsite closure.
- The DOE worked closely with the CDPHE and EPA throughout preparation of the proposed IM/IRA and with the Environment and Waste Management subcommittee of the Citizens Advisory Board starting in March 1994. The Citizens Advisory Board, Rocky Flats Local Impacts Initiative, Jefferson County, and the regulatory agencies reviewed the draft IM/IRA-EA Decision Document. The comments provided were believed to be reflective of public concerns.
- DOE also briefed national and local political officials regarding the details of the proposed IM/IRA. CDPHE and EPA met with Jefferson County officials to discuss the remediation and closure plans for OU4. Members of the press

were invited to many of the public forums, and several newspaper articles have been published.

**Tours of Operable Unit 4** - Several tours were offered during the past six months. The first tour was provided to the Citizens Advisory Board in October 1994. During March 1995, three tours were offered to the general public. Notification was provided in public meetings as well as in two news articles appearing in the Denver Post and the Rocky Mountain News.

An additional public hearing will be held for the OU4 closure. However, the scope of this hearing will be limited to comments related to CDPHE modifying the existing Resource Conservation and Recovery Act (RCRA) permit to incorporate changes presented in the Final IM/IRA-EA Decision Document.

In response to the specific questions regarding the formation of task forces, a task force already exists to assist DOE in determining the appropriate final land use at Rocky Flats. The Rocky Flats Local Impacts Initiative is addressing future land use through its task group, the Rocky Flats Future Site Use Working Group, which is facilitated by the Boulder firm, CDR. Interested parties may contact CDR at telephone number (303) 442-7367 or visit their offices at 1215 Spruce, in Boulder. The determination of cleanup levels is driven by future site use and related regulatory requirements. Therefore, the formation of an additional advisory task force to address this issue is not warranted. If the public wishes to form a task force to evaluate other alternatives, DOE will consider any reasonable proposal that conforms to regulatorily required constraints and schedules. However, due to funding restrictions, DOE cannot financially support any new or additional task forces.

### **I.1.3 NEED FOR REMEDIATION**

#### **Issues/**

**Comments:** The public expressed uncertainty as to whether or not remediation of OU4 was necessary. Many commentors indicated that remediation activities should be conducted now, while other commentors stated that a remedy could not be chosen without having a comprehensive plan and/or a decision regarding the final land use for Rocky Flats. One commentor stated that DOE needs to be aware of all the facts and implications. Several commentors suggested that more funds are needed for research, while other commentors believe that too much money is being wasted on finding solutions versus remediation. Some commentors encouraged DOE to continue funding to remediate Rocky Flats. One commentor

asked what happens if the new contractor feels that the OU4 IM/IRA is not a priority project. This commentor also asked what would happen in the event of project over-runs or DOE budget cuts.

**Response:** The Interagency Agreement is the comprehensive plan developed for remediating Rocky Flats. The remediation priorities were extensively debated during the development of the Interagency Agreement, and the public participated in establishing the priorities. The closure and remediation of the Ponds was considered a high priority in order to reduce potential risks to human health and the environment. Therefore, the schedule for remediating OU4 has preceded many other activities. In keeping with the decisions and schedules that formed the basis of the Interagency Agreement, DOE cannot delay the closure and remediation of OU4 because the final land use determination has not been made. Given that the immediate need is to reduce current potential risks and close OU4, DOE would be irresponsible in requesting a delay. Therefore, DOE intends to proceed with the closure and remediation of OU4 as soon as possible.

The lack of a final land use determination has no bearing on the proposed IM/IRA since the soil remediation levels are already based on the most conservative and restrictive land use scenario (e.g., residential use). As noted in Section I.1.2 of this Responsiveness Summary, a task force is in the process of providing DOE with a recommended final land use. The Jefferson County Board of Commissioners passed a resolution dated September 8, 1994, to advocate a position that DOE should maintain the undeveloped buffer zone of open space around the Rocky Flats in perpetuity. Based on this resolution and other information, the DOE Rocky Flats Field Office Future Site Use Working Group recommended that onsite residential use be eliminated from the future land use plan, and that remediation of buffer zone Operable Units should be based on an open space future land use scenario (see meeting minutes, December 8, 1994). Therefore, the OU4 proposed IM/IRA provides a level of protection greater than the final land use scenario will require. DOE considers the over-protectiveness provided by the proposed IM/IRA to be justifiable to meet the schedule and risk reduction goals set forth in the Interagency Agreement.

DOE believes that the level of research and funding expended to develop the proposed IM/IRA, assess available facts, and consider potential implications exceeds the efforts that are normally undertaken at other CERCLA sites. Researchers at DOE's Hanford and Los Alamos National Laboratory sites have been evaluating engineered covers for the last 8 years. The results of this research were incorporated into the proposed IM/IRA. DOE believes that this

extra effort was not in vain and was necessary to address regulatory agency and public concerns. DOE also believes that additional research is not required, and desires to start remediation efforts as soon as possible.

Finally, funding in a time of budget reductions is a significant concern. DOE annually provides a budget to the U.S. Congress which includes a request for funds to remediate the Rocky Flats site as well as many other equally important projects. Congress must consider the budget requests with respect to all the other needs of the nation. Should the actual funding appropriated by Congress be less than the requested budget, remediation project priorities may require significant alteration to wisely use these limited resources. The new contractor does not have unilateral authority to reprioritize remediation projects. Any changes in project priority would require acceptance by DOE, EPA, and CDPHE. In the event that the actual costs exceed the project funding level, then DOE will have to decide whether to reallocate funding from other projects, cancel or delay future projects, use extra funds from underspent projects, or request additional funding. The DOE will make this decision on a case-by-case basis.

#### **I.1.4 CONSIDERATION OF OTHER ALTERNATIVES**

This section addresses general issues and comments related to alternatives that some commentors believed were not properly considered in the OU4 IM/IRA-EA Decision Document. The issues and comments were grouped into the following six categories:

- The overall process for identifying alternatives and the criteria used to evaluate these alternatives;
- The need to develop a national and/or state-of-the-art solution;
- Consideration of an alternative that stores contaminated soils and waste in concrete cubicles;
- Consideration and selection of an onsite, aboveground storage facility;
- Removal of all contaminants from OU4; and
- Consideration of an onsite, centralized landfill.

Each of the above subissues is addressed separately in the following subsections.



#### I.1.4.1 Alternative Identification and Evaluation Criteria

##### Issues/

**Comments:** Based on some of the comments received, there seems to be a perception that either the DOE did not evaluate alternatives, or that none of the alternatives evaluated in the IM/IRA-EA Decision Document was acceptable. One commentor simply stated "consider alternatives," while another commentor noted that the range of options evaluated was not adequate. The Citizens Advisory Board and one other commentor asked if the DOE would consider any innovative alternative that the new site contractor may recommend. One commentor stated that the evaluation elements in the "Primary Balancing Criteria" are not of equal importance and suggested that they either be rated (1) high, medium, and low similar to the general response actions (GRAs), or (2) numerically to get more representative relationships. Some commentors asked the DOE to select the safest, not the cheapest, solution.

**Response:** DOE considered more than 20 remedial technologies during the selection process for the proposed IM/IRA. Technologies not germane to the permanent closure and remediation of OU4 were eliminated based on screening criteria which included evaluation of the technology's proven effectiveness, applicability, implementability, and cost. The technologies that were retained and eliminated based on the screening are presented below.

##### Retained Technologies

- No action,
- Continue groundwater and vadose zone monitoring,
- Temporary cover,
- Engineered cover,
- Containerization,
- Mechanical excavation,
- Degradation,
- Size reduction,
- Solidification and stabilization,
- Soil washing,
- Solvent extraction,
- Onsite storage, and
- Offsite disposal.

Eliminated Technologies

- Adsorption,
- Precipitation,
- Organic polymerization,
- Incineration,
- Thermal desorption,
- Vitrification,
- Electrokinetics, and
- Soil flushing.

Section III.3.1.1 of the IM/IRA-EA Decision Document describes each technology considered and indicates the reasons why certain technologies were eliminated from further consideration.

The retained technologies were then assembled into general response actions to provide a representative range of alternatives that could be comparatively evaluated. It is important to note that the DOE, CDPHE, and EPA agreed that only permanent solutions for the pond closure should be evaluated, thus eliminating interim alternatives such as long-term onsite storage. The five general response actions retained were as follows:

- No action,
- Containment (closure in place),
- *In situ* treatment with containment (closure in place),
- Contaminated media removal with offsite disposal, and
- Contaminated media removal with *ex situ* treatment.

Suboptions were also considered under some of the general response actions. A detailed evaluation of the general response actions was conducted to rank each action consistent with the CERCLA evaluation criteria established by EPA. These criteria include:

- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirements;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability; and
- Cost.

Section III.5 of the IM/IRA-EA Decision Document provides the specific results of the detailed analysis of general response actions. The EPA does not provide guidance on the relative importance of the "primary balancing criteria." The DOE, CDPHE, and EPA discussed methods to rank the importance of the primary balancing criteria. It was determined that ranking the importance of the criteria would be subjective and the agencies could not agree on their relative importance. Therefore, all evaluation criteria were assumed to be equally important.

Based on the detailed analysis, DOE determined that containment (closure in place) was the most appropriate general response action. DOE considers the proposed IM/IRA to be the most cost-effective solution to meet regulatory requirements without jeopardizing the safety of the public or the environment. This general response action consists of consolidating contaminated OU4 materials, and an engineered cover over contaminated areas to close the Ponds. The selected general response action is protective of human health and the environment, meets all applicable or relevant and appropriate requirements, is effective over the long term, can be implemented in accordance with the Interagency Agreement schedule, and is fiscally responsible. The implementation of "safer" solutions cannot be justified when considering the limited benefits in reducing environmental risks versus the increase in costs and potential hazards to remediation workers.

DOE, CDPHE, and EPA will consider any innovative ideas that the new contractor may have for the closure of the OU4 Ponds. However, the innovative idea must be superior (i.e., provide a greater level of protection to human health and the environment, expedite the construction schedule, or reduce costs) to the proposed IM/IRA. It should be noted that implementation of an innovative idea is not a unilateral decision by the new contractor and the DOE, but must be approved by the EPA and CDPHE.

#### **I.1.4.2 National/State-of-the-Art Solution**

##### **Issues/**

**Comments:** Several commentors indicated that a national and/or state-of-the-art solution should be considered. Other commentors indicated that the remedial solution needs to be safe and permanent. Another commentor voiced an opinion that the remediation needs to be handled in the safest possible way and as soon as possible. One commentor stated that a real solution is required and another commentor just stated "clean it up right." Other commentors expressed a desire

for a remedial solution that prevents the possibility of further soil and groundwater contamination.

**Response:** DOE considers that to postpone remediation while a "national" solution is developed would be very speculative and irresponsible. Furthermore, DOE does not believe that a national solution which is superior to the proposed IM/IRA can be developed in the near future, and if one is developed soon, its implementation could be many years away. Since the Interagency Agreement requires DOE to close and remediate the Ponds within a specific timeframe, EPA and CDPHE have indicated that delaying the OU4 remediation activities or providing temporary storage is not acceptable. Therefore, DOE must continue to move forward with plans to permanently close the Ponds to comply with its regulatory obligations.

The OU4 proposed IM/IRA provides a permanent solution and incorporates state-of-the-art design features intended to prevent the possibility of further soil and groundwater contamination. The design of the engineered cover is based on 8 years of research conducted at DOE's Hanford Site and Los Alamos National Laboratory. In addition, the engineered cover will have a state-of-the-art post-closure monitoring system for the purpose of ensuring that the engineered cover is functioning as anticipated to protect human health and the environment.

Although the total removal of all contaminants for offsite disposal may appear to be the safest solution, DOE had to consider the potential hazards to workers due to increased handling of the waste, potential for transportation accidents, and the long-term protectiveness of the waste at the offsite disposal facility. In considering these other potential hazards and the level of contamination exhibited by the OU4 materials, DOE determined that offsite disposal was neither safer nor more cost-effective than the proposed IM/IRA. In conclusion, the proposed IM/IRA is a real, "clean it up right" solution.

#### **I.1.4.3 Concrete Cubicles**

##### **Issues/**

**Comments:** One commentor recommended that DOE place contaminated materials in concrete cubicles lined with lead inside and outside to isolate contaminants from resources and biosystems.

**Response:** Although DOE appreciates the commentor's recommendation, this proposed solution is not necessary due to the waste type, and does not offer a significant

benefit to the public. The proposed solution is not an acceptable alternative for the following reasons:

- Test results indicate that leaching of contaminants from the OU4 materials does not pose a significant risk to the environment. Based on these results, it was determined that the engineered cover alone provides adequate protection to isolate the contaminants from resources and the biosystems. Therefore, placing the OU4 materials in concrete or other containers is not required.
- Lead shielding is not required to safely handle the OU4 materials since the radiation fields associated with these materials are at very low levels. The primary radionuclide contaminants in the OU4 contaminated materials are alpha particle emitters. Alpha particles have low energy radiation which cannot penetrate paper or clothing. Therefore, lead shielding is not required for this type of contaminated material.
- Lead is a toxic metal and, therefore, poses a potential risk if it leaches from the container into the environment.

Since lead-lined concrete cubicles do not provide any additional safeguards to preventing the release of contaminants into the environment or protecting workers from radiation exposure, placing the OU4 materials in these containers cannot be supported. In fact, the introduction of lead-lined cubicles beneath the engineered cover would introduce a large quantity of a potential new contaminant which could leach into the environment. The use of containers would also require additional handling, thus increasing worker safety hazards. Furthermore, containerization of the OU4 materials would significantly increase the remediation cost unnecessarily. This funding should be used to solve other remediation concerns at Rocky Flats.

#### **I.1.4.4 Onsite Aboveground Storage**

##### **Issues/**

**Comments:** Based on numerous comments, some members of the public would prefer that the DOE provide temporary storage in onsite aboveground facilities. Some commentors believe that the consolidation of contaminated materials below ground is irresponsible. Many commentors perceive that aboveground storage is superior to the proposed IM/IRA because the storage facility can be easily monitored and repaired, and the materials can be easily retrieved when a final

national solution is found. Some commentators consider that aboveground storage is safer than underground storage.

**Response:** DOE considered the aboveground storage alternative during development of the IM/IRA, and determined that this alternative was not acceptable since temporary storage is not a final solution. DOE, CDPHE, and EPA concluded that the selected remedial alternative must provide a final solution. DOE also considers that alternatives which postpone remediation to allow development of a national solution is very speculative and irresponsible (see Section I.1.4.2 of this Responsiveness Summary). If temporary storage were a viable alternative, it would most likely be eliminated for the following reasons:

- The commentators are correct that aboveground storage facilities are easier to monitor and repair; however, the storage facility has other significant problems. For example, the facility would need to be continually maintained to repair damage caused by exposure to the elements (i.e., sunlight, wind, freeze/thaw cycles, and precipitation). The maintenance activities would unnecessarily increase the potential for worker exposure to contaminants or occupational injuries. The potential hazards associated with these maintenance activities are eliminated by the proposed IM/IRA since the engineered cover is below grade and protected from exposure to the elements.
- In the long run, temporary storage does not solve the problem. Eventually, the storage facilities would need to be closed and the contaminated materials would need to be removed for disposal. The storage facility itself could become contaminated thus increasing the volume of waste requiring disposal. The unnecessary increase in waste management requirements result in a more costly solution that exposes workers to additional contamination and occupational hazards.
- The construction of a facility large enough to store all of the OU4 materials would require disturbance of a significantly larger area. One of the goals of the proposed IM/IRA is to restrict excavation activities to contaminated areas, thereby minimizing potential impacts to the environment. It is likely that currently uncontaminated, undisturbed areas would be required to construct aboveground storage facilities which could lead to unnecessary environmental impacts and/or spread of contaminants.

It is estimated that the capital cost alone would add an additional \$110 million dollars to the remediation costs. DOE currently does not have sufficient funding

to implement an alternative such as temporary aboveground storage which does not provide a final closure/remediation of OU4, does not provide an added level of protection, increases the potential for impacts to the environment during construction, and exposes workers to additional contamination and occupational hazards.

#### **I.1.4.5 Total/Complete Cleanup of OU4**

##### **Issues/**

**Comments:** Based on some of the comments received, there seems to be a perception that the OU4 area should be remediated completely. Some commentors indicated that offsite disposal is the only way to ensure protection to human health and the environment and that offsite disposal is worth the money. One commentor stated that any cleanup that does not remove, relocate, and contain nuclear/chemical waste in a safe and permanent manner is not cleanup. Other commentors do not believe that the burial of the material constitutes "cleanup."

**Response:** Removal of all contaminated material for offsite disposal was considered and eliminated. Sections III.5 and III.6 of the IM/IRA-EA Decision Document provide the detailed analysis of this alternative, which is listed as General Response Action IV. Although the total removal of all contaminants for offsite disposal may appear to be the safest solution, DOE concluded that:

- The overall risks from the contaminated materials are merely transferred to another location, and the ultimate protection of human health and the environment relies on the performance of the offsite disposal facility.
- There is a greater potential for adverse impacts over the proposed IM/IRA due to increased handling of the waste, longer implementation schedule, and possibility of transportation accidents.
- The complete removal of all the contaminated materials (liners, soils, pondcrete, sludge, and debris) with disposal offsite is estimated to cost more than \$900 million dollars, which is approximately nine times the cost of the proposed IM/IRA and far exceeds DOE's available funding.

Because of these factors, the total removal of contaminated materials alternative ranked lower than the proposed IM/IRA. In fact, removal of contaminated materials for offsite disposal was determined to be the worst alternative with respect to the CERCLA evaluation criteria.

#### **I.1.4.6 Centralized Onsite Landfill**

##### **Issues/**

**Comments:** One commentor encouraged DOE to consider the recent proposal from CDPHE that there be a centralized low level radioactive waste landfill created onsite, instead of a number of de facto low level radioactive dumps onsite.

**Response:** DOE considered the onsite landfill alternative during the development of the IM/IRA. This alternative was eliminated by DOE, EPA, and CDPHE since it could not be implemented for remediating OU4 within the timeframe mandated by the Interagency Agreement. DOE estimates that it would take 5-10 years to site, permit, and construct a new centralized landfill for low level radioactively contaminated hazardous waste.

Although this alternative may not be appropriate for OU4, DOE is considering the CDPHE suggestion to construct an onsite centralized landfill for the disposal of other remediation wastes at Rocky Flats. If such a proposal looks promising, DOE may consider inclusion of the OU4 materials. Meanwhile, DOE must continue to move forward with plans to permanently close the Ponds to comply with its regulatory obligations.

Furthermore, DOE is not creating a number of de facto low level radioactive waste landfills. DOE has proposed a closure and remedial solution which is legally allowable, complies with all regulatory requirements, and is protective of human health and the environment.

#### **I.1.4.7 Hot Spot Remediation**

##### **Issues/**

**Comments:** One commentor provided a specific proposal for the remediation of OU4. This commentor stated that no matter what is done, the current location of the closure will always be thought of as "risky" because the contaminants will be subjected to an unpredictable groundwater table and a potentially slumping hillside. This could necessitate long-term costs for monitoring and rework if nature performs its usual unexpected acts. This commentor proposes to combine General Response Actions 1 and 2 to move the more hazardous of the wastes to a more benign area. The suggested remedial alternative would entail:

- Recomputing site risk levels by site-specific tailored methods;



- Identifying "hot areas" for removal/treatment to meet site criteria;
- Selecting a stable, observable, and controllable location for a centralized onsite disposal/storage facility;
- Depositing sludge, pondcrete, and removed "hot stuff" from OU4; and
- Grading and revegetating OU4.

**Response:** DOE considers the proposed IM/IRA to be an appropriate closure and remedial action for OU4 which addresses groundwater table and stability concerns. The proposed IM/IRA, as well as all of the general response actions, including the commentors proposal, are subjected to monitoring and rework cost should an expected failure occurs. Therefore, the proposed IM/IRA should not be eliminated just because unexpected incidents may occur.

With respect to the commentor's specific proposal, DOE agrees that the OU4 risk levels could be recomputed to be more consistent with what is currently being proposed on a site-wide basis. However, the regulatory agencies have not yet provided final approval for the site-wide risk levels. Until approval is received, the OU4 remediation goals must be based on conservative factors. If the regulatory agencies disallow the use of the site-wide risk levels at OU4, the removal of "hot spots" would be the same as what is currently identified in the IM/IRA-EA Decision Document. Issues regarding the development of an onsite centralized storage/disposal facility are addressed in Sections I.1.4.4 and I.1.4.6 of this Responsiveness Summary.

Although DOE is not ignoring the commentor's proposal, regulatory agency concurrence of several key actions is required to allow implementation of the proposal.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

### **I.1.5 ENVIRONMENTAL IMPACT STATEMENT**

**Issues/**

**Comments:** Numerous commentors suggested that DOE prepare an environmental impact statement with a high level of public involvement.

**Response:** DOE disagrees that an environmental impact statement needs to be prepared and considers the IM/IRA-EA Decision Document, in conjunction with the opportunities provided for public involvement, to fulfill all requirements under the National Environmental Policy Act. The standard National Environmental Policy Act compliance process for the OU4 IM/IRA was initiated in September 1993 with the preparation of an Environmental Checklist and Action Description Memorandum. Under the National Environmental Policy Act, DOE is required to identify the level of documentation (either an environmental assessment or an environmental impact statement) that needs to be prepared if it is determined that the proposed action could potentially impact the environment. DOE concluded that an environmental impact statement was not required based on regulations in 10 CFR 1021, in addition to DOE and EPA policies. DOE determined that the preparation of an environmental assessment was appropriate since the OU4 IM/IRA was being conducted in a disturbed industrial area and because the action would result in environmental improvement. It is DOE's policy to integrate National Environmental Policy Act and CERCLA documents as sanctioned in a June 1992 directive from DOE which eliminated the need to prepare separate National Environmental Policy Act documentation for CERCLA remedial actions implemented under a Record of Decision.

DOE considers that the IM/IRA-EA Decision Document conforms to the National Environmental Policy Act's alternative evaluation and public involvement requirements. In fact, the DOE's public involvement program for the OU4 IM/IRA project (described in Section I.1.2 of this document) exceeds the public involvement requirements for an environmental assessment. Furthermore, DOE considers that preparing an environmental impact statement for the OU4 IM/IRA would not generate any additional information which would change the decision to select the proposed remedy. DOE believes that a Finding of No Significant Impact will be issued to allow the proposed IM/IRA to be implemented.

Pursuant to the requirements of an environmental assessment, the potential impacts to human health and the environment are addressed in Section IV.10 of the IM/IRA-EA Decision Document and include:

- Human health risk,
- Ecological risk,
- Air quality,
- Groundwater quality,
- Surface water quality,
- Commitment of irreversible and irretrievable resources,
- Natural phenomenon hazards,
- Transportation impacts,
- Short-term vs. long-term impacts,
- Cultural/historical and archeological impacts, and
- Cumulative impacts.

The DOE anticipates no significant impact to human health and the environment as a result of implementing the proposed IM/IRA.

In addition to the IM/IRA-EA Decision Document prepared for OU4, efforts are already underway to prepare a site-wide environmental impact statement which addresses the entire remediation program at Rocky Flats. The Notice of Intent to prepare the site-wide environmental impact statement was published in the Federal Register on August 5, 1994 (see Federal Register Volume 59, Page 40011). The public meeting to scope the site-wide environmental impact statement was held on August 23, 1994. Although the site-wide environmental impact statement is addressing alternatives that are similar to those alternatives evaluated in the OU4 IM/IRA, the National Environmental Policy Act's process for the Rocky Flats environmental restoration program, and the OU4 IM/IRA are being treated as separate actions to comply with the schedule mandated by the Interagency Agreement.

#### **1.1.6 PROTECTIVENESS OF PROPOSED REMEDY**

A number of comments questioned the protectiveness of the proposed remedy. These comments and concerns were grouped into the following five categories:

- Protection of human health, worker safety, wildlife, and the environment;
- Potential for leakage;
- Long-term effects, goals, and costs; and
- Long-term monitoring.

Each of the above subissues is addressed separately in the following subsections.

**I.1.6.1 Protection of Human Health, Worker Safety, Wildlife, and the Environment**

**Issues/**

**Comments:** Based on some comments received, there seems to be a perception that the proposed IM/IRA is not protective of human health and may be unsafe to workers. One commentor stated that failure to comply with the safety, health, and environmental laws and regulations faults all parties. Another commentor stated that the potential health risks are too great to take the matter of cleanup lightly. Other commentors consider that the Rocky Flats is too close to an expanding community to allow a "dirty closure." One commentor voiced a concern for the protectiveness to site workers. Numerous commentors voiced a concern that the proposed IM/IRA could impact groundwater resources and would be difficult to provide final treatment of the wastes in the future. One commentor is concerned that radioactive wastes will continue to impact water and air. Another commentor noted that other different species depend on clean soils and water. Another commentor specified that all environmental impacts should be addressed.

**Response:** The proposed IM/IRA is protective of human health, worker safety, wildlife, and the environment. Pursuant to CERCLA regulations, a remedy that does not adequately protect human health and the environment cannot be selected. DOE, EPA, and CDPHE have worked closely together to identify safety, health, and environmental laws and regulations (applicable or relevant and appropriate requirements) for each of the general response actions. The identification of these ARARs are contained in Part III (Section III.5.3) of the IM/IRA-EA Decision Document. This list of ARARs is considered to be comprehensive of the requirements for protecting worker safety, human health, and the environment. How the proposed IM/IRA complies with these ARARs is addressed in Part IV (section IV.11) of the IM/IRA-EA Decision Document. Some standards, such as the CDPHE Part 2 siting requirements for new hazardous waste disposal facilities, were considered to be overly protective, but were nevertheless factored into the design to ensure that the engineered cover provided a high degree of protection. DOE believes the involvement of these regulatory agencies ensures compliance with all laws and regulations. Since the commentor did not identify any specific violations, DOE considers the comment to be unfounded.

DOE also used sophisticated computer models to assess the potential health risks that could result from implementing the proposed IM/IRA. The results of this

DOE also used sophisticated computer models to assess the potential health risks that could result from implementing the proposed IM/IRA. The results of this assessment are presented in Part IV (Section IV.10) of the IM/IRA-EA Decision Document. The modeling results indicate that onsite remediation workers and offsite residents will not be exposed to contaminants in excess of EPA protection standards when excavating contaminated soils or constructing the final engineered cover. It should be noted that this potential exposure pathway is short-term (occurring only during excavation and construction activities) and is expected to be similar for each remedy considered. Although risks during remediation of OU4 are expected to be negligible, workers will wear personal protective equipment, including respirators (if necessary) and coveralls, to prevent exposure to contaminants.

The potential long-term risks resulting from airborne, surface water, and groundwater contamination were also considered. The engineered cover, which is approximately 11 feet thick, will isolate contaminants from the air or surface waters. The thickness of the final cover is also considered to prevent inadvertent intrusion into the contaminated materials. Therefore, the proposed IM/IRA is protective with respect to these exposure pathways.

Sophisticated computer modeling was used to determine whether the infiltration of precipitation through the engineered cover could leach contaminants from the consolidated materials at concentrations which pose a human health hazard. The computer modeling is based on very conservative assumptions which tend to overestimate the actual risk. Although a small amount of precipitation may penetrate the engineered cover over time, the computer modeling indicates that leachate concentrations will be less than health-based standards established by EPA and CDPHE to protect drinking water supplies.

A fence with warning signs will be erected around the engineered cover to further restrict access. Only authorized personnel will be allowed to enter the fenced area to conduct the required post-closure monitoring and maintenance activities. Workers should not be exposed to any significant levels of contamination when conducting these post-closure activities.

The distance provided between the engineered cover and the Rocky Flats boundary is more than adequate to protect the surrounding communities and exceeds regulatory requirements for facilities which pose similar hazards. DOE is committed to maintaining a buffer zone between the closed Ponds and the community to ensure that the pond materials are adequately isolated.

With respect to wildlife protection, DOE conducted a field survey to identify the species and habitats associated with OU4. In general, OU4 is a highly disturbed industrial area that provides little natural habitat for only a few species of wildlife. It was determined that less than 1 acre of wetlands are located within the OU4 area that will be disturbed. Although this wetland area is minimal, DOE has committed to establishing replacement wetland area within Bear Creek State Park. DOE will be conducting another field survey during the spring/summer of 1995 in the OU4 buffer zone to determine if any endangered or threatened species, or critical habitats, may be impacted by the proposed IM/IRA. If required, a mitigation plan will be prepared to protect these habitats. It should be noted that these existing wetlands and critical habitats (if present) would be disturbed regardless of which alternative was selected.

It is proposed that the remediated areas in the vicinity of the engineered cover (north hillside and OU4 buffer zone) will be backfilled with clean soils and vegetated to re-establish a native habitat for wildlife. In addition, the engineered cover will have an 18-inch thick layer of heavy rip-rap (rock material) designed to prevent burrowing animals from damaging the integrity of the cover or to come in contact with contaminated materials. These provisions will ensure that wildlife has clean soil and water.

#### **I.1.6.2 Potential for Leakage**

##### **Issues/**

**Comments:** Some members of the public voiced a concern that there would be leakage from the proposed IM/IRA. One commentator indicated that the existing Ponds have leaked and assumes that leakage would also occur with the proposed IM/IRA. Other commentators requested the installation of a liner to prevent leakage. One commentator does not believe that the engineered cover will prevent leaching of contaminants into the environment during a heavy rainstorm or flood over the 1,000-year period. Another commentator declared that it was not safe to line the Ponds with concrete since it will crumble and crack with time.

**Response:** DOE has evaluated the potential for leakage and determined that the engineered cover is designed to preclude leakage that could adversely affect groundwater resources. Sophisticated computer modeling was conducted to determine whether the engineered cover is adequate to protect groundwater resources. The cover's performance in preventing leakage was assessed using EPA's Hydrologic Evaluation of Landfill Performance (HELP) model. The HELP model has been developed over many years and is the standard method for determining engineered

cover performance. Comparison of model results against actual field data indicates that the HELP model can be used to adequately predict the amount of infiltration through engineered covers over a variety of climatological conditions. The HELP model results were used in combination with other models to conservatively estimate the leachability of contaminants from the consolidated materials. The results of this modeling effort indicate that the engineered cover will protect the underlying groundwater resources. Additional tests on the solidified sludge materials are being conducted to verify the leaching model results.

Although leakage did occur during operation of the Ponds, it is not appropriate to assume that the engineered cover will also allow leakage. The Ponds leaked because the water level in the units created hydraulic pressures which forced water to migrate through cracks in the liners. Now that the Ponds have been completely drained, the hydraulic pressures will cease. It is expected that the water table beneath the Ponds will become lower due to draining the units, thus indicating that this contaminant release mechanism has ceased. The engineered cover is designed and will be operated to prevent leakage. The top of the engineered cover is sloped to drain precipitation away from contaminated materials. One component of the engineered cover is a low-permeability asphaltic layer beneath a drainage layer to ensure that infiltration through the cover is negligible. The moisture content of the materials consolidated beneath the engineered cover will be minimized to the extent practicable. Unlike the operation of the SEPs, water will not be introduced into the closure. In the unlikely event that groundwater rises to a height where it could contact the contaminated materials, a subsurface drain will intercept the groundwater and cause it to drain away from the engineered cover area.

DOE evaluated the need for a liner and has determined that one is not required based on the HELP and leaching model results. The benefit a liner installed beneath contaminated materials to prevent leakage has been debated between EPA and the Nuclear Regulatory Commission (NRC) for the design of mixed radioactive and hazardous waste disposal facilities. Both agencies recognize that waste could become immersed in liquid with the installation of liners. To prevent the waste from becoming saturated, the EPA and NRC developed a joint conceptual design which uses a liner only to facilitate leachate collection during the initial operation of the land disposal facility when the potential for leaching is greatest. Elimination of the liner is consistent with this EPA/NRC guidance since the closure of the SEPs will not have a lengthy operational period where a large amount of precipitation could come in contact with the contaminated

materials. Elimination of the liner is also consistent with CDPHE regulations (6 CCR 1007-2, Part 2) which only require leachate control, not liners and leachate collection. DOE, in conjunction with EPA and CDPHE, determined that installing a liner would require unnecessary long-term maintenance activities to ensure its proper functioning; therefore, it was not consistent with the design criteria to provide a passive system for the 1,000-year period of performance. As such, no sub-liner will be provided. The only concrete proposed to be used is to solidify the sludge/pondcrete in a cement matrix. This concrete mixture will be mixed with soils and be compacted to form a stable base for the engineered cover. An asphaltic concrete layer will be installed as a component of the engineered cover to prevent precipitation infiltration.

Part IV Section IV.10.7.2 of the IM/IRA-EA Decision Document addresses potential for flooding to impact the engineered cover. It was determined that the OU4 area does not lie within a floodplain, and the area surrounding the engineered cover has good drainage characteristics. The engineered cover has an internal drainage layer above the low-permeability asphalt layer to direct precipitation to the edge of the engineered cover, thus preventing precipitation from coming into contact with the contaminated pond materials. In addition, surface drainage typically increases during large storm events because precipitation falls faster than can be absorbed by the soils. Model results indicate that a 100-year storm event increases infiltration into the engineered cover by only 0.0003 inches per year and does not impact the groundwater resources (see Sections IV.3.1.3 and IV.10.4 of the IM/IRA-EA Decision Document).

#### **I.1.6.3 Long-Term Effects, Goals, and Costs**

##### **Issues/**

**Comments:** Some commentors feel that the DOE did not consider long-term goals during selection of the proposed IM/IRA. Numerous commentors feel that the proposed IM/IRA is only a short-term solution for a long-term danger from uranium and plutonium. One commentor noted that the contaminants of concern will remain dangerous after the 1,000-year period for performance for the engineered cover. Other commentors stated that over a 1,000-year period, the engineered cover would certainly fail and that there is no long-term guarantee that the closure system will remain protective. One commentor indicated that it is impossible to have a perfect solution to address all incidents, including change of climate and water level, that could occur in the next 1,000 years. This commentor considers the recommended remedy to be a good proposal and recommends not to shoot it down. The Citizens Advisory Board advised DOE that if it chooses to use the



proposed RCRA cap over the Ponds at Rocky Flats, DOE should consider this project a means of providing interim containment and storage of the pond materials.

**Response:** Some confusion may stem from the title "Interim Measure/Interim Remedial Action." DOE considered the long-term goals and effects of the proposed IM/IRA and agrees with the commentor that it is a good proposal. DOE considers that the proposed IM/IRA is a final and permanent closure/remedial action for OU4 which will protect future generations. The proposed IM/IRA is not a means to provide interim containment and storage of the pond materials.

The 1,000-year period of performance for the engineered cover is based on a CDPHE regulatory requirement for hazardous waste disposal facilities (see 6 CCR 1007-2, Part 2) and was not established as a risk-based criteria for protecting human health and the environment. The 1,000-year period was determined to be a reasonable design basis for the engineered cover and includes consideration of probable events such as water table rise, slope in stability, and floods. Although the hazards posed by the contaminants will not change over the 1,000-year period, modeling indicates that the engineered cover is more than adequate to protect human health and the environment from exposure to the contaminants. Part IV Section IV.10 of the IM/IRA-EA Decision Document provides an analysis of the long-range impacts of the proposed IM/IRA.

#### **I.1.6.4 Long-Term Monitoring**

##### **Issues/**

**Comments:** Based on comments received, there seems to be a perception that the proposed IM/IRA cannot be adequately monitored. Other commentors would like to see a longer monitoring period. The Citizens Advisory Board and other commentors requested indefinite monitoring. The Citizens Advisory Board and other commentors recommended that the DOE develop a comprehensive monitoring plan before beginning closure. The Citizens Advisory Board also requested that DOE develop a plan to remove the engineered cover and the materials under it before the planned conclusion of the interim storage period should it become necessary. One commentor requested that the DOE prepare a plan for the excavation of the engineered cover in the event that the monitoring detects a system failure. Another commentor indicated that the proposed IM/IRA will cost more money in the long run due to having to re-excavate it when the system fails.

**Response:** DOE believes that the proposed monitoring systems are adequate and exceed regulatory requirements. Part V of the IM/IRA-EA Decision Document describes these state-of-the-art post-closure monitoring systems and provides a framework for the monitoring procedures that will be implemented. In summary, the proposed monitoring consists of:

- A liquid detection system that will be installed within the engineered cover to determine the degree of infiltration through the cover;
- A liquid sampling system that will be installed within contaminant materials to determine if contaminants are leaching from the pond materials;
- A groundwater monitoring network that will be installed around the engineered cover to determine if contaminant leaching is adversely impacting groundwater resources; and
- A settlement monitoring system to assess the stability of the engineered cover.

DOE considers that additional monitoring systems are not warranted at this time. Model results demonstrate that the engineered cover is protective, and the monitoring proposed is designed to verify the cover's performance. The length of the 30-year post-closure monitoring is dictated by regulatory requirements. This monitoring period is a minimum requirement and can only be terminated upon the approval of CDPHE. In fact, the monitoring period may be extended should historical monitoring results indicate that a potential problem may occur sometime in the future. DOE feels that specifying a longer monitoring period is not justified without having some monitoring results to assess the long-term performance of the engineered cover.

Part V of the IM/IRA-EA Decision Document contains the comprehensive post-closure monitoring plan. This plan will be supplemented with detailed information (i.e., locations, geologic description, construction logs) that will be obtained during installation of the monitoring systems. The plan will also be supplemented with sample collection and analytical procedures that are currently followed for monitoring other areas at Rocky Flats. All of this information will be provided in a formal post-closure care permit application that will be submitted to the regulatory agencies for approval. The level of detail required for the permit application is not needed in the IM/IRA-EA Decision Document.

DOE disagrees that the system will fail, and therefore believes that it is not prudent to prepare a plan for such an unlikely event. The post-closure monitoring and maintenance activities are designed to assess the performance of the engineered cover to demonstrate that it is functioning as designed. Should post-closure monitoring indicate that the engineered cover has failed (i.e., the system is no longer protective of human health and the environment), the appropriate repairs will be made. Excavation of the pond materials will be the last resort if repairs are not able to satisfy the requirements for protecting human health and the environment. The engineered cover will not impede recovery of the contaminated pond materials in the unlikely event that they are required to be excavated.

The proposed IM/IRA will not result in a more costly solution in the long run. DOE believes that the proposed IM/IRA is equivalent to the long-term level of protection provided by other surface impoundment closures and land disposal facilities. Therefore, even if DOE were able to expend 10 times the amount of money as the proposed IM/IRA will cost to transfer the pond materials to an offsite disposal facility, there is the potential that the materials would need to be re-excavated from the offsite disposal facility. Therefore, the long-term cost of the offsite disposal facility option could be significantly higher than the proposed IM/IRA.

#### **I.1.7 PONDCRETE AND SLUDGE MANAGEMENT**

**Issues/**

**Comments:** A few public comments addressed the disposition of pondcrete. One commentor asked what the DOE was planning to do with the pondcrete. Another commentor requested that DOE should clean up the remaining 8,200 blocks of pondcrete as soon as possible. Another commentor questioned why 70 10,000-gallon containers of sludge are present at Rocky Flats and what DOE plans to do with this sludge. One other commentor specified an opinion that the DOE should disposition pondcrete and sludge as part of the IM/IRA since the closure design is conservative and the wastes should not increase the environmental risks if appropriate monitoring measures are taken. The Citizens Advisory Board was divided on whether the DOE should include pondcrete and sludge in the SEP closure.

**Response:** DOE agrees that the pondcrete and sludge should be included in the Ponds closure since the design is conservative and the dispositioned materials will not increase the environmental risks. The pondcrete consists of sludge previously removed

from the ponds and stabilized using cement compounds. This material is being stored onsite since an offsite disposal facility is not available. Additional sludges were removed from the Ponds so that the liners and soils beneath the Ponds could be characterized. The pondcrete and sludge will be stabilized via a cementation process (which will be constructed as part of the OU4 IM/IRA), and will be blended with the OU4 contaminated soils for consolidation beneath the engineered cover. The sludge is being temporarily stored in 82 10,000-gallon tanks until the new cement processing facility is constructed. The process details are described in Part IV (Section IV.3.6) of the IM/IRA-EA Decision Document.

The proposed processing and consolidation of the pondcrete and sludge complies with CDPHE's closure requirements for the Ponds (6 CCR 1007-3, 265.228), which allow waste materials to be closed in-place as long as the closure complies with the landfill closure requirements and is protective of human health and the environment. The consolidation of the pondcrete and sludge beneath the engineered cover meets both of these requirements.

DOE agrees that cleanup of the pondcrete should occur as soon as possible. Closure and remediation of the Ponds provide an opportunity for the cleanup and safe isolation of this material in a cost-effective manner. Consolidation of the pondcrete and sludge under the engineered cover will also reduce inspection and maintenance of the pondcrete storage facilities. This cost savings could then used to support other remediation projects.

DOE also agrees that the engineered cover is conservatively designed and that the consolidation of the pondcrete and sludge will not increase the environmental risk since adequate monitoring will be provided. DOE assessed the potential impacts of consolidating the pondcrete and sludge under the engineered cover. The modeling results are contained in Section IV.10 of the IM/IRA-EA Decision Document and indicate that the closure of the SEPs, including these waste materials, is protective of human health and the environment.

## I.2 SPECIFIC COMMENTS

Many public comments address very specific technical items presented in the IM/IRA-EA Decision Document or issues which could not be grouped under any of the general topics discussed in Section I.1 of this Responsiveness Summary. These specific public comments are addressed in this section and are grouped into the following topics:

- Risk Assessment;

- Groundwater Remediation,
- Design and Construction,
- Potential Failures, and
- Miscellaneous Concerns.

The comments and responses for each of the above specific topics are provided in the following sections.

### 1.2.1 SPECIFIC COMMENTS CONCERNING RISK ASSESSMENT

The following specific comments were received with respect to the risk assessment methodologies that were used to identify the OU4 contaminants of concern.

**Comment:** What justifies the equal allocation of TRs (target excess lifetime cancer risk), i.e., 1.0 E-6/N to each radionuclide? This may be acceptable as a macro selection technique for "highest risk" elements, but just because some of the individual PRGs exceed their respective 95% UCLs does not mean that the "SITE" has exceeded its 1.0 E/6 risk criteria! The total "Site" should be evaluated by weighing each individual contributor by its contribution to the whole. In fact, I was not able to find where the "Site" was compared back to the total criteria of 1.0 E/6 for any combination of contaminants.

**Response:** Equal allocation of the target risk to each contaminant of concern (i.e.,  $10^{-6}$  divided by the number of contaminants of concern) is based on regulatory agency guidance and negotiations between DOE and EPA/CDPHE. It is assumed that the commentor's concern is that the area to be remediated may be larger than required under the equal allocation assumption. The commentor is correct in pointing out that there are many ways that the total  $10^{-6}$  risk can be allocated between the different contaminants of concern while maintaining the overall "Site" risk below  $10^{-6}$ . The equal allocation of the total  $10^{-6}$  risk may not be the optimum risk allocation combination in terms of reducing the amount of soil to be excavated. For example, more soils may need to be excavated under the equal allocation assumption when a few widely distributed contaminants of concern are above the allocated risk, while all other contaminants of concern are detected at insignificant concentrations or are restricted to "hot-spots."

Although the commentor is correct in pointing out that this type of "Site" analysis was not conducted, DOE believes that such an analysis is not required to demonstrate that the IM/IRA is protective of human health and the environment. The equal allocation assumption provides a risk combination that will ensure that the overall "Site" risk is below  $10^{-6}$ . This conservative approach was followed since the information required to calculate risk from all exposure pathways (i.e., groundwater and surface water exposure) was not included in the scope of the Phase I IM/IRA for OU4. This additional information is being obtained and an overall "Site" risk assessment will be conducted as part of the Phase II investigation to demonstrate that the proposed IM/IRA provides an adequate level of protection and to determine if additional remediation of groundwater is required. Without such an analysis, DOE believes that the conservative approach used to determine the preliminary remediation goals is justifiable and that optimizing the allocation of risk at this time could require the remediation of additional soils in the future (depending upon the risk from the pathways that were not evaluated in the Phase I program).

Although the allocation of risk could change the amount of soil requiring remediation, changing the final land use would have a greater impact on the calculated preliminary remediation goal values. Therefore, DOE considers that the reevaluation of the preliminary remediation goals should be given a higher priority than a reallocation of risk because the DOE, EPA, and CDPHE have agreed that the onsite resident scenario is not required to establish preliminary remediation goals. Until a decision is made to recalculate the preliminary remediation goals, DOE believes that it is not in DOE's or the community's best interest to attempt to reallocate the risks between the various contaminants of concern.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** Each toxin or radionuclide effect multiple organs/systems in the body, not "ONE". It is not reasonable to assume that the intake of an element has some probability of distribution to any one of several organs? If so, this dispersion of effects is not accounted for in the PRG calculations and could significantly reduce the overall impact.

If these two issues are correct, recalculate the GRA "SITE level" compatibilities for the Threshold Criteria "Overall Protection of Human Health and the Environment". Is the 1.0 E/6 total "SITE" criteria exceeded? Does the

weighted importance of the elements shed any new light on other alternatives for cleanup?

**Response:** Yes, it reasonable to assume that the intake of a contaminant may affect multiple organs. However, these dispersion effects are already adequately accounted for in establishing the preliminary remediation goal values for OU4. The toxicity information used to calculate the preliminary remediation goals was obtained from EPA-managed databases (e.g., IRIS and HEAST). Although the toxicity information is developed from specific target organ studies, the toxicity information is not separated by individual organ-specific risks. Instead, it is assumed that a carcinogen may cause cancer in any tissue in the body, not only in the organs which were the focus of a particular study. Therefore, toxicological information required to determine the impact to specific target organs is not available at this time. Therefore, the calculated preliminary remediation goals are deemed to be protective of the entire human body, not just specific target organs.

The development of contaminant-specific toxicity information should not be confused with the allocation of the cumulative risk for OU4 between multiple contaminants. The allocation of the risk was performed to establish preliminary remediation goals that would ensure an overall "Site" risk of less than  $10^{-6}$ . The decision to allocate the cumulative risk in this manner does not alter the toxicity information on which the preliminary remediation goals were calculated. In fact, contaminants of concern that have the potential to affect multiple organs were included in the risk allocation for each individual target organ to ensure that the risk allocation was conservative. In cases where the contaminant of concern affected multiple organs, the lowest of the preliminary remediation goals was used. Therefore, the preliminary remediation goals do not need to be recalculated.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** The exposure scenarios for both residential and industrial personnel may be acceptable in the grand scheme of the USA, but are they applicable to the OU4 site? Has anyone attempted to tailor the "RAGS exposure scenarios" for OU4 site specific application? This is but one of many issues that exists because we are not sure where we are going with the cleanup. Provide historical evidence of attempted tailoring if available.

**Response:** The residential and construction worker exposure scenarios were applicable to OU4 at the time the IM/IRA was being developed. DOE, in conjunction with the regulatory agencies, "tailored" certain aspects of the EPA's risk assessment guidance for these exposure scenarios specifically for OU4. Information regarding the development of these exposure pathways is presented in Part III (Section III.2) of the OU4 IM/IRA-EA Decision Document. Additional historical information in tailoring EPA's guidance is contained within the administrative record. The degree of "tailoring" is subject to the approval of the regulatory agencies. As previously stated in other responses, the "tailoring" was based on conservative assumptions since decisions such as final land use were not finalized and the OU4 preliminary remediation goals were not based on all the possible exposure scenarios.

Subsequent to negotiation of the "tailoring" for the OU4 preliminary remediation goals, DOE developed sitewide preliminary remediation goals based on more realistic exposure scenarios and site-specific exposure factors. DOE is still in the process of negotiating these sitewide preliminary remediation goals with the EPA and CDPHE. As a result of these negotiations, the residential exposure scenario may be eliminated as the basis for remediation. Although DOE believes that proceeding with the OU4 IM/IRA with preliminary remediation goals based on the onsite resident scenario ensures protectiveness of human health, DOE is considering whether the scope of the OU4 IM/IRA can be reduced using a more realistic sitewide exposure scenario, thereby reducing remediation costs while providing an equally protective solution.

**Action:** The response to this comment does not currently require a change in the IM/IRA-EA Decision Document. However, revisions may be required if the DOE re-calculates the OU4 PRGs.

**Comment:** What is the nature and extent of contamination that will remain untreated below the landfill once it is in place? Won't this contamination remain a source of groundwater contamination due to leaching and groundwater transport? What are the risks associated with the contaminants that will remain untreated in subsurface soils below the landfill? What is the plan for remediation of subsurface soils surrounding the landfill and how will installation of the landfill impact the design of remedial alternatives for this contamination?

**Response:** The estimated mass of contaminants that will be dispositioned beneath the engineered cover is provided in Part IV (Section IV.3.1.1) of the IM/IRA-EA Decision Document. Computer modeling was conducted to determine if these



contaminants could be a future source of groundwater contamination. The modeling results are provided in Part IV (Section IV.10.4) of the IM/IRA-EA Decision Document and indicate that the engineered cover will prevent the migration of contaminants at concentrations which could adversely impact the groundwater. The engineered cover will also preclude exposure to contaminants via air and surface water pathways. Therefore, the residual risks posed by the untreated contaminants in the consolidated materials are insignificant.

In general, subsurface soils outside the Ponds boundary do not require remediation. The Phase I characterization results indicate that subsurface soil contamination is restricted to areas directly beneath the Ponds. Although the engineered cover will preclude adverse impacts to the groundwater due to the infiltration of precipitation, modeling results indicate that the groundwater could be impacted from a future rise in the groundwater table. To prevent this occurrence, subsurface soils beneath the engineered cover will be excavated to the depth of the mean seasonal high groundwater elevation to install a subsurface drain.

It is assumed that the contaminants are being flushed from subsurface soils located below the mean seasonal high groundwater elevation. Therefore, technologies that will remediate the groundwater are considered to be an effective means to remediate any contaminants in these subsurface soils (if the Phase II program results indicate that remediation is required). The engineered cover will not impact implementation of groundwater remedial alternatives. Should the results of the Phase II investigation indicate that additional subsurface soil remediation is required, the appropriate actions will be taken.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** The "Risk Determination Fact Sheet" for OU-4 provided in the CAB information packet provided by our staff indicates that there are significant risks associated with surface soil contamination and that surface soil contaminant concentrations will not exceed the preliminary remediation goals (PRGs) following remediation. Why are preliminary cleanup levels being proposed apparently without more detailed evaluation of health risks? Research on the potential migration of plutonium in the soil column suggests that it tends to be relatively immobile. How does this effect the potential for plant uptake and ingestion of garden vegetables by hypothetical future residents? What are the future risks associated with groundwater ingestion at OU-4? What are the risks to hypothetical residents or

workers at OU-4 that are due to contamination at adjacent OUs (e.g., surface soil radionuclides cast of the 903 pad)? How do the risks associated with the above or other potential exposure pathways affect the PRGs that have been calculated? If additive health effects are assumed, doesn't the exclusion of PCOCs that were detected in surface soils at concentrations below the PRGs result in an underestimate of the potential health risk? If the PRGs are to be used as cleanup levels, do they take additive effects into account? What plan is in place to ensure that the cleanup level that is chosen for surface soil is achieved? For example, will post-cleanup surface soil samples be collected? How many? Will a statistical sampling design be implemented? How will the planned excavation of the ponds impact this process? Will soil sampling be performed to ensure that surface soils were not contaminated by the remediation process?

**Response:** a) **Why are preliminary cleanup levels being proposed apparently without more detailed evaluation of health risks?**

A more detailed evaluation of the health risks is proposed to be conducted during the Phase II investigation. The preliminary remediation goals are "preliminary" only in name. Closing the Ponds was considered to be a high priority project by the CDPHE and EPA to reduce the overall risk posed by Rocky Flats. The use of conservative preliminary remediation goals was deemed to be appropriate in lieu of extending the remediation schedule to include the Phase II program results for a detailed evaluation of the health risks. DOE considers the proposed IM/IRA to be a final remedial action for OU4 since the methodology used to calculate these goals is conservative.

b) **Research on the potential migration of plutonium in the soil column suggests that it tends to be relatively immobile. How does this effect the potential for plant uptake and ingestion of garden vegetables by the hypothetical future resident?**

Exposure pathways addressing uptake of homegrown fruits and vegetables or local crops were not considered due to the improbability of subsistence farming or gardening in the Ponds area. All contamination soils will be consolidated under the engineered cover, which is 11 feet thick. The engineered cover will also have a biotic barrier to prevent plant roots from contacting the consolidated media. Therefore, it is unlikely that a hypothetical future resident would be exposed to plutonium due to the ingestion of garden vegetables.

**c) What are the future risks associated with groundwater ingestion of OU4?**

Risks associated with exposure to contaminants present in groundwater will be addressed under the Phase II program or under a sitewide groundwater investigation. This future information will be used to determine whether groundwater requires remediation.

**d) What are the risks to hypothetical residents or workers at OU4 that are due to contamination at adjacent OUs (e.g., surface soil radionuclides east of the 903 pad)?**

The risks to hypothetical residents or workers at OU4 resulting from exposure to contamination at adjacent OUs were not included as part of the IM/IRA-EA Decision Document. The risks associated with each OU are being evaluated on an OU-by-OU basis. Therefore, consideration of the potential exposure to contaminants which may be present at adjacent OUs is an unnecessary duplication of work. It is assumed that the adjacent OUs will also be remediated to acceptable risk levels.

**e) How do the risks associated with the above or other potential exposure pathways affect the PRGs that have been calculated?**

As indicated in response parts b, c, and d of this comment, the risks associated with these other exposure pathways do not affect the OU4 preliminary remediation goals which are based on conservative assumptions and the most predominant exposure pathways. Exposure to potential OU4 groundwater contamination will be addressed as part of the Phase II investigation. The risks associated with adjacent OUs will be evaluated independent of OU4. Therefore, these risks do not need to be included in the calculation of the OU4 preliminary remediation goals.

**f) If additive health effects are assumed, doesn't the exclusion of concentrations below the PRGs result in an underestimate of the potential health risk?**

The compensation for additive adverse effects occurs prior to comparison of the site concentration versus the risk-based preliminary remediation goal. (The risk-based preliminary remediation goal makes an attempt to account for the additive effects independent of and prior to the screening/elimination process).

Therefore, because the elimination of analytes with concentrations in soils less than the already cumulative-type preliminary remediation goal value should not result in underestimating actual risk. Regulators consistently caveat risk-based preliminary remediation goals by stating that additive adverse effects are not accounted for unless the preliminary remediation goals (for noncarcinogens) are mathematically adjusted by dividing the target hazard index by some factor. For OU4 risk analysis, both noncarcinogen and carcinogen preliminary remediation goals were conservatively adjusted by dividing the risk and hazard quotient variables in the preliminary remediation goal equation by the highest number of analytes in a group (including the chemical-specific preliminary remediation goal analyte) that impacted any target organ.

- g) If the PRGs are to be used as cleanup levels, do they take additive effects into account?**

Yes, the preliminary remediation goals calculated for OU4 account for additive effects for those exposure pathways considered.

- h) What plan is in place to ensure that the cleanup level that is chosen for surface soil is achieved? For example, will post-cleanup surface soil samples be collected? How many? Will a statistical sampling design be implemented? How will the planned excavation of the ponds impact this process? Will soil sampling be performed to ensure that surface soils were not contaminated by the remediation process?**

Post-excavation samples will be collected and analyzed for contaminants of concern to verify that the remaining soils are below established cleanup levels. The details of this plan are presented in Part IV (Appendix IV.G) of the IM/IRA-EA Decision Document. Sampling will also be conducted to demonstrate that implementation of the proposed IM/IRA does not adversely impact the environment.

It is proposed that samples be collected on a 10-meter-by-10-meter grid from remediated areas outside of the engineered cover. Statistical evaluation of the data may be conducted to demonstrate that sample results over a specified remediation area are below the cleanup levels. The procedures to statistically evaluate the sample results, if required, will be identified when the results are obtained and processed. Verification samples are not required to be collected within the boundary of the engineered cover. The materials consolidated beneath the engineered cover are not required to meet the cleanup levels.

Modeling has already demonstrated that the engineered cover will provide adequate containment of contaminants expected to be encountered in the consolidated materials.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

**Comment:** The risk assessment does not consider the possibility of human intrusion in all scenarios.

**Response:** The DOE agrees with this comment. However, assuming all intrusion scenarios is not necessary since a more conservative scenario was assessed. The risk assessment was performed for an onsite resident living at the toe of the engineered cover for a lifetime. This is more conservative than estimating the short-term construction scenario for excavating into the consolidated contaminated material (intrusion scenario). The intrusion scenario was not performed because the engineered cover has a 2½-foot-thick layer of large rock material which is a biotic barrier to plant and wildlife intrusion. This material would not be a barrier to human intrusion, but it would be a significant deterrent to most methods of excavation. The risk is higher for a long duration exposure (chronic exposure) that an onsite resident could receive. The risk to an intruder is very low since they would be exposed to low concentrations for only a short duration (acute exposure). The DOE considered that the onsite resident was a more conservative and appropriate scenario than the intrusion scenario.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

### 1.2.2 SPECIFIC COMMENTS CONCERNING GROUNDWATER REMEDIATION

The following specific comments were received with respect to the potential for the proposed IM/IRA to impact groundwater.

**Comment:** The Citizens Advisory Board recommends that DOE have a design for groundwater remediation (Phase 2) before beginning a closure of the Solar Ponds (Phase 1).

**Response:** The DOE is required to conduct these actions as scheduled in the Interagency Agreement. It is likely that the Phase II characterization information will be evaluated and a conceptual design for a groundwater remediation system, if

required, will be developed prior to beginning closure of the Ponds. However, the DOE, CDPHE, and EPA agreed that closure of the Ponds could commence prior to remediating groundwater as long as the selected remedy does not preclude installation of a groundwater remediation system. DOE has determined that the proposed IM/IRA is consistent with and does not interfere with groundwater remedial alternatives. In fact, the proposed post-closure monitoring system will provide information that could be useful in determining the need for and approach to groundwater remediation. Additional information regarding this issue is provided in Part IV (Section IV.11.6) of the IM/IRA-EA Decision Document.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** What are the interrelationships between Phase I & Phase II IM/IRA's? Are there overlaps (i.e., critical Phase I, Phase II interfaces) in which Phase II could significantly jeopardize Phase I because of faulty assumptions? In particular, what happens to Phase I if the assumption that the soil beneath the "high groundwater elevation" requires remediation? Define high risk areas between Phase I & Phase II if any, and mitigation plans.

**Response:** The interrelationships between the Phase I IM/IRA and the Phase II remediation programs for OU4 are as follows:

- The Phase I IM/IRA addresses the closure of the SEPs and the remediation of adjacent soils. The Phase II IM/IRA addresses primarily the potential for groundwater remediation.
- A requirement of the Phase I program is that the IM/IRA cannot interfere with implementation of Phase II remedial alternatives.

No overlaps would significantly jeopardize Phase II because of faulty assumptions. The potential impacts the proposed IM/IRA on groundwater were evaluated, and modeling results indicate that the engineered cover will adequately protect the groundwater. However, the Phase II investigation may identify that previously uncharacterized soils may need to be remediated, including the saturated soils beneath the "mean seasonal high groundwater elevation." It is believed that such soils are only present directly beneath the proposed engineered cover. Although the engineered cover will preclude intrusion into the saturated soils, the potential migration of contaminants from

these soils via the groundwater will be assessed. Since the soils beneath the subsurface drain are either permanently or occasionally saturated, these soils have been and will continue to be flushed by groundwater. If this flushing of contaminants has a negative impact on the groundwater, an extraction system may be installed downgradient of the solar evaporation ponds. However, inclined wells could be installed to extract groundwater from saturated soils beneath the engineered cover. No mitigation plans are necessary since the engineered cover does not preclude alternatives to remediate the groundwater.

**Action:** This discussion will be added to Section IV.11.6 of the IM/IRA-EA Decision Document entitled, "Consistency with the Final Remedy."

**Comment:** It is unclear why this project has been divided into two phases and why issues concerning remediation of contaminants in groundwater have been relegated to Phase II. Based on information presented in EG&G's Well Evaluation Report (April, 1994), there is a significant amount of groundwater contamination underlying the Solar Ponds, including radionuclide as well as volatile organic compounds. Has the DOE addressed how the Phase I landfill design will impact the evaluation and selection of remedial alternatives for groundwater? For example, will the presence of a landfill preclude the construction of a groundwater treatment facility above the area where the aquifer is most contaminated at OU-4? How will future plume mapping be performed at OU-4 if a landfill is present?

**Response:** The DOE, EPA, and CDPHE agreed to expedite the closure of the SEPs via a Phase I IM/IRA program separate from the remediation of groundwater. DOE addressed how the proposed IM/IRA will impact the Phase II groundwater remediation program in Part IV (Section IV.11.6) of the IM/IRA-EA Decision Document. The DOE, EPA, and CDPHE have determined that separating the Phase I and Phase II programs allows the expedited closure of the ponds to meet the requirements of the Interagency Agreement without limiting or constraining potential alternatives for groundwater remediation.

Although DOE acknowledges that the groundwater is not fully characterized (chemically), there is adequate groundwater level information to adequately design a pond closure system which is protective of the groundwater. Since the proposed closure system will not impact the groundwater flow system, a groundwater extraction and treatment facility can easily be constructed. Future plume mapping will be based on upgradient and downgradient wells. The location of a plume directly below the engineered cover can be inferred using

the upgradient and downgradient measurements and computer modeling to determine the fate and transport of these contaminants. Extraction wells, if required, can be located downgradient of the engineered cover to effectively stop the migration of contaminants. If direct remediation of a plume located beneath the engineered cover is required, angled extraction wells can be installed.

**Action:** Part IV (Section IV.11.6) of the IM/IRA-EA Decision Document will be modified to include the information noted above.

**Comment:** What will happen to the groundwater contaminant plume in the time it takes to complete Phase I? It appears that vital time will be lost and that significant contaminant migration will continue to occur in groundwater. The DOE and regulatory agencies should re-evaluate whether groundwater remediation should be separated from surface and subsurface soil remediation at the Solar Ponds and what the impacts of such a decision will be on groundwater treatment alternatives.

**Response:** The existing Interceptor Trench System downgradient from the Ponds will continue to be operated to collect contaminated groundwater until such time that it is replaced by another system or the groundwater is determined to be clean. This system currently collects the groundwater for treatment and will not be impacted by implementation of the proposed IM/IRA. Therefore, there should not be any significant additional impact to groundwater during completion of the Phase I closure and the Phase II characterization activities. DOE and the regulatory agencies decided that the Phase I program could be implemented ahead of the Phase II program since the existing Interceptor Trench System is collecting groundwater downgradient from the SEPs for treatment. The DOE considers that the separation of Phase I and Phase II will allow the closure of the SEPs to be expedited without impacting the potential alternatives for groundwater remediation. The potential impacts are discussed in Part IV (Section IV.11.6) of the IM/IRA-EA Decision Document.

**Action:** Part I (Section I.0) of the IM/IRA-EA Decision Document will be modified to include a statement, "The DOE, CDPHE, and EPA agree that the Phase I program can be expedited ahead of the Phase II program since the existing Interceptor Trench System (ITS) is presently collecting groundwater downgradient from the SEPs for treatment."

**Comment:** It is of great concern that the landfill is designed to leak from below. This, in my opinion, is a serious design flaw. In effect, source isolation has not been



achieved and the design must rely on secondary (as yet unspecified) treatment processes (to be developed in Phase II) to detect, capture and treat contaminants that are released from below the landfill due to the rise and fall of the water table. This process of contaminant release is likely to be in place after 30 years of post-closure monitoring and may be in place for the landfill's entire 1,000-year life span. Thus, the groundwater detection, capture, and treatment processes must be operational for the same amount of time. What will be the cost associated with this? Are the estimated costs for this alternative underestimated? This re-emphasizes the point about combining the remedial design for the groundwater with the landfill design. The DOE should consider an impermeable lower lining to achieve complete source isolation.

**Response:** This commentor incorrectly states that the proposed IM/IRA is designed to leak from below. The engineered cover is designed to minimize precipitation from infiltrating into the consolidated materials. Computer modeling demonstrates that the engineered cover will prevent migration of contaminants at concentrations which could adversely impact the groundwater. The modeling results are provided in Part IV (Section IV.10.4) of the IM/IRA-EA Decision Document. Although the engineered cover will preclude adverse impacts to the groundwater, modeling results indicate that the groundwater could be impacted from a rise in the groundwater table. To prevent this occurrence, subsurface soils beneath the engineered cover will be excavated to the depth of the mean seasonal high groundwater elevation to install the subsurface drain. Therefore, the subsurface drain is not designed to collect leakage from the consolidated materials, but is intended to prevent clean groundwater from becoming contaminated as a result of saturating the materials consolidated beneath the engineered cover.

The subsurface drain consists of porous natural materials and is sloped to allow intercepted groundwater to flow laterally to discharge points north of the engineered cover. The base of the subsurface drain will be installed at the mean seasonal high water table elevation. The system will be installed slightly above the normal water table elevation so that the system will remain dry throughout most of the year. During some years in the late spring/early summer, the water table may rise into the drain.

A groundwater treatment system is not proposed as a component of the Phase I IM/IRA because the combination of the engineered cover and the subsurface drain already prevents the consolidated contaminated materials from impacting groundwater. Therefore, the costs of a potential groundwater remediation

system are not required to be factored into the cost of the OU4 proposed IM/IRA. The need to remediate contaminated groundwater from the previous operation of the solar evaporation ponds will be addressed during the Phase II investigation.

**Action:** Part IV (Section IV.3.1.5) of the IM/IRA-EA Decision Document will be modified to clarify that, "The subsurface drain was selected as the method of groundwater control because the subsurface drain could function passively for the 1,000-year performance period whereas an impermeable liner could not. Analysis in Part III (Appendix III.D) demonstrated that under saturated conditions leachate could develop at conditions that pose an unsafe risk to groundwater users. The build-up of leachate upon a liner system would present a higher risk than the slow small quantity release that could occur with the subsurface drainage layer. Part IV (Section IV.10.4) provides modeling results demonstrating that a small amount of leachate migrating through the closure system will not have a negative impact on groundwater at the toe of the engineered cover."

.....  
**Comment:** How does this remedial decision affect future groundwater use (either commercial, agricultural or residential)?

**Response:** The DOE considers that this remedial decision will not impact future groundwater use since the subsurface drainage layer will isolate the consolidated contaminants from potentially rising groundwater, and leachate generated from infiltrating precipitation will be in small volumes which will not impact groundwater quality.

**Action:** Part IV of the IM/IRA-EA Decision Document (Section IV.11.6) will be modified to state, "The proposed IM/IRA will not impact future groundwater use since the subsurface drainage layer will isolate the consolidated contaminants from potential rising groundwater, and leachate generated from infiltrating precipitation will be in small quantities which will not impact groundwater quality at the point of compliance."

### **I.2.3 SPECIFIC COMMENTS CONCERNING THE DESIGN AND CONSTRUCTION OF THE PROPOSED IM/IRA**

The following comments were received with respect to the design and construction of the proposed IM/IRA.

**Comment:** Is the actual construction process of the engineered cover a low or high risk project? The many layers of soils of various thickness and densities to be deposited above the asphaltic layer could be very difficult to control during construction. Low or high risk and why.

**Response:** Construction of the engineered cover system will be a low-risk activity. Engineered covers consisting of multiple earthen layers have been successfully constructed at many closure sites throughout Colorado and the United States. Construction quality assurance/quality control requirements will be developed to ensure that the system is constructed according to the design drawings and specifications. Appendix IV.F of the IM/IRA-EA Decision Document provides a summary of the quality assurance/quality control program.

**Action:** Part IV (Section 6) of the IM/IRA-EA Decision Document will be modified to indicate that construction of the proposed IM/IRA has a low risk.

.....  
**Comment:** No sand/gravel filter is going to stay open to air or water flow for 1,000 years, or even 1 year without a means to backwash and repair.

**Response:** The above comment is not accurate; backwashing and repair of the sand/gravel filter are not required. Eight years of research conducted at the DOE's Hanford facility on prototype engineered cover designs demonstrates that the sand/gravel filters and the capillary break have functioned as intended. Backwashing and flushing are performed routinely in sand/gravel filters within wastewater treatment systems that are intended to receive large volumes of water with high concentrations of total suspended solids. This is not the case for the proposed IM/IRA. Very small amounts of precipitation are expected to infiltrate into the sand/gravel filter because water will be retained in the upper fine-grained soils by pore pressure and capillary tension until the fine-grained soils are saturated. The soils will have a high moisture retention capacity and the vegetation will act to remove stored moisture from the soils via the biological process of transpiration. The DOE does not consider that the system will fail due to clogging of the sand/gravel filters.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** The foundation and structure of the SEPs are unstable. The floor and walls of the ponds heave and fail due to the unrelenting flow and hydrostatic pressure from groundwater that comes from the large watershed in Coal Creek Canyon.

The north slope of the OU4 area is unstable due to groundwater pressure to break out and clayey alluvium soil on a steep slope. The site failed to pass the minimum naval test for earthquake stability, which is not surprising considering the large slope failure in about 1970.

**Response:** DOE shares the commentor's concerns regarding the stability of the north hillside, and has evaluated these stability concerns in developing the design for the engineered cover. The installation of the subsurface drain and the proposed regrading of the north hillside will improve the stability of the north hillside.

The DOE performed a geotechnical evaluation of the north hillside and evaluated the data with a computer model (under conservative conditions) called XSTABL. The results of this mathematical model indicate that under conservative conditions the hillside is stable. However, under conditions of significant seismic stress, the hillside could become unstable. DOE is planning to conduct additional studies to determine whether any faults are present in the vicinity of the Ponds that could impact the stability of the engineered cover. DOE will re-evaluate the hillside stability with the XSTABL model after data are received from the upcoming seismic studies. Additional mitigative measures will be implemented if the hillside is determined to be unstable.

**Action:** DOE will re-examine the hillside stability modeling upon completion of an investigation into potential faults.

.....  
**Comment:** Any plans to safely contain radioactive waste onsite at Rocky Flats must include a visionary consideration of the aesthetics of the final design. It would truly add insult to injury if the end result were to be a huge ugly tomb that might be with us for centuries. The enclosed report depicts a number of strategies for addressing the aesthetics of large reclamation sites. I hope you find it of interest and will circulate it among the persons responsible for approving any final designs. It is important to address this issue from the very start of any planning or design considerations.

**Response:** Although DOE does not believe that the proposed IM/IRA is aesthetically displeasing, aesthetic appearance was not a criterion for the design of the engineered cover. DOE opted to ensure that the engineered cover was protective of human health and the environment. However, the engineered cover should look like a natural hillside since its topography is similar to the surrounding area, and it will be planted with native Colorado plant species. The plants are also a very important functional component of the engineered cover design. The

plants will help prevent erosion and will remove moisture from the soils by the biological process of transpiration.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** One commentor requested to see more empirical data which was used to develop the proposed IM/IRA. Specifically, the commentor requested experimentation results conducted at other sites that contain similar kinds of contamination to demonstrate that the proposed scenarios do indeed work and that these scenarios indeed, as matter of fact, support the models that have been used to establish the plans for Rocky Flats. The commentor requested to see some data that supports the economics of comparing the proposed scenarios and the proposed contamination containment systems. Finally, the commentor also requested to see some empirical data based on experimentation to support the concepts of producing concrete to reasonably demonstrate that the concrete will not begin to deteriorate and again produce a problem that has to be recycled.

**Response:** The requested empirical data for the preparing the cost estimates are provided in Part III (Appendix III.H) of the IM/IRA-EA Decision Document. The unit costs are based on historical information for projects completed at Rocky Flats, other DOE sites, and commercial facilities; price quotations from vendors and supplies; cost estimating guides and references; and professional engineering judgement. The cost estimates were prepared and reviewed by experienced individuals who are familiar with these types of remediation and construction projects. Other supporting documentation is or will be available through the administrative record located in the public reading rooms. Although this information was used to prepared the IM/IRA-EA Decision Document, the level of detail contained in these supporting documents is not required to be included in the IM/IRA-EA Decision Document. The commentor is encouraged to visit a public reading room to review the requested empirical data and supporting documentation.

The proposed IM/IRA is based on the experimental results from the research performed at the Los Alamos National Laboratory and at the Hanford Site. Research at Los Alamos focused on the effectiveness of evaporation and vegetation transpiration at removing moisture from soils. This research demonstrates that evaporation and transpiration in semi-arid environments can remove more moisture during a year than would be expected from the annual average precipitation. Eight years of research at Hanford culminated with the

construction of a prototype engineered cover which is very similar to the design proposed for the OU4 Ponds. DOE representatives at Rocky Flats have interacted with the research teams from these other DOE facilities to benefit from their research. Technical papers from these research projects were used as a basis for the IM/IRA design.

Treatability studies are being conducted for the sludge/pondcrete processing. The reports containing the results of these treatability studies are due to DOE in the summer of 1995. Copies of these reports will also be submitted to the administrative record where they will be available for public review.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....

#### **I.2.4 SPECIFIC COMMENTS CONCERNING THE POST-CLOSURE MONITORING SYSTEM**

The following comments were received with respect to the post-closure monitoring system.

**Comment:** Monitoring the closure should entail at least two separate requirements: 1) Stability of the "As Built Design" 2) Satisfactory and predictable performance.

The proposed monitoring scheme addresses the performance concerns by various liquid sensors within the cover and the engineered cover slope incline for erosion. Internal design stability concerns will be deduced indirectly through the performance measures only. As an example, if the performance measure begin to drift from expected or acceptable values, we are now left with the arduous task of defining the failure and its location. This will be tantamount to guessing where and how bad the leak in the roof is by only being allowed to observe the drips from the living room ceiling. The key unobservable feature of the design is the Asphaltic Cover (AC). Unlike the subsurface drain, which has an arguably effective monitor in the Neutron Probe Access Tube, malfunctions in the Asphaltic Cover will only be indicated by the FDC and possibly the Neutron Probe. It is highly doubtful that whatever predictor models are developed they will be able to shed much light on this critical membrane. In addition, because the AC is theoretically repairable, locations of failures could be very important.

Why is the Asphaltic Cover not explicitly monitored for detection and isolation of distortions, cracks, etc. that could violate its design integrity?

NOTE: Possible sensors:

- \* Imbedded matrix of breakwires
- \* Imbedded strain gauges
- \* Imaging Ground Penetrating Radar

**Response:** Explicit monitoring of the asphaltic layer for detecting and isolating distortions and cracks is not provided since this type of monitoring is difficult and does not provide an indication of the overall performance of the cover system. The asphaltic layer functions in conjunction with the other components of the engineered cover to minimize infiltration of water into the consolidated materials. The presence of isolated cracks and distortions in the asphaltic layer does not necessarily indicate failure of the engineered cover. Furthermore, the asphaltic layer is somewhat flexible. Therefore, movement of the asphaltic layer (including differential movement) is expected and does not indicate failure. In addition, the asphaltic layer is contained within a "self-repairing" system of materials which will tend to naturally fill in and plug any cracks that develop. Therefore, slight movement or even cracking of the asphaltic layer would not directly indicate a leak.

The amount of water which infiltrates into the consolidated materials is more representative and indicative of cover performance than monitoring the structural integrity of individual components of the engineered cover such as the asphaltic layer. Therefore, direct measurement of the moisture content was included in the monitoring program as a means to provide an early warning and direct indication of unacceptable levels of infiltration through the cover system.

A significant amount of spatial redundancy was built in to the placement of the monitoring instruments. This was done to maximize the probability of detecting and determining the exact location of a wetting front. Should unacceptable moisture levels be detected in the consolidated materials, additional investigations may be needed to determine the cause of the failure. The degree of spatial resolution afforded by the proposed instrument locations is considered sufficient to guide any additional investigations and subsequent corrective action, if required.

Although the use of ground penetrating radar on a regular basis was not considered to be cost-effective during development of the monitoring system design, this technology may play an important role in the event that a failure is suspected. More detailed evaluation of the use of such technologies prior to any

intrusive corrective action may be included in the post-closure permit application.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

**Comment:** The groundwater monitoring program which will be defined in Phase II could have been addressed in more detail in the Phase I documents. I did not get a confident feeling when I saw the long table of applicable constituents but could not find nitrates, a drinking water contaminant, listed. Parameters should be selected based on previous use and on detection in the pondcrete and sludge. I feel the monitoring period of 30 years is not enough, even though this is the minimum requirement under RCRA. I recommend that the OU4 groundwater monitoring activities should be incorporated in a total plant site monitoring program not to duplicate efforts. Other scheduled monitoring activities, for the cap, should have been addressed in the Phase I documents. The analytical results should be made available to the public, either by providing the information at the monthly data exchange meetings and/or in the annual Rocky Flats Site Environmental Report.

**Response:** Part V of the IM/IRA-EA Decision Document addresses monitoring of the proposed closure system. After the initial 1-year baseline period, DOE will routinely analyze for indicator species which have a high mobility or have high quantities in the consolidated media. However, the potential contaminants of concern will be analyzed once each year for comparison to the background levels. The data collected from the moisture monitors within the engineered cover will help determine if additional analysis is required. (The presence of higher quantities of moisture than normal would trigger analysis for additional parameters.) This strategy will reduce the post-closure analysis costs while maintaining the ability to assess the effectiveness of the closure system.

The length of the 30-year post-closure monitoring is dictated by regulatory requirements. This monitoring period is a minimum requirement and can only be terminated upon approval of the CDPHE. In fact, the monitoring period may be extended should historical monitoring results indicate that a potential problem may occur. DOE feels that specifying a longer monitoring period is not justified without having some monitoring results to assess the long-term performance of the engineered cover.



It is DOE's intent to integrate the OU4 and plant-wide groundwater monitoring activities to avoid duplication of effort. The monitoring results will be reported to the regulatory agencies and to the public consistent with the provisions of the approved post-closure permit, regulatory requirements, and DOE orders. Monitoring results will be available to the public through DOE or the regulatory agencies.

**Action:** Part V of the IM/IRA-EA Decision Document will be clarified with respect to this sampling and analysis strategy.

**Comment:** The document does not address who is responsible if contamination escapes from the closure into the "outside world". In 10, 20, 100 and up years if unacceptable contaminates escape who fixes and/or pays for damages? Is there a designated responsibility or will it be left up to the courts to decide? The document should address this concern.

**Response:** DOE and/or any subsequent property owner will be responsible for ensuring that the closure remains protective of human health and the environment.

**Action:** Part V of the IM/IRA-EA Decision Document will be modified to state that DOE and/or the subsequent property owner will be responsible for performing corrective actions to the OU4 closure system as required to protect human health and the environment.

#### I.2.5 SPECIFIC COMMENTS CONCERNING POTENTIAL FAILURES OF THE CLOSURE SYSTEM

The following comments were received addressing potential future failures of the closure system which could reduce the effectiveness of the system to protect human health and the environment.

**Comment:** The factor of safety values in the Table 2 for short- and long-term stability of the hillside indicates somewhat "marginal" results.

Would the 100%, 200%, 300% of normal rainfall conditions, analyzed for the engineered cover, have any impact on the 4 scenarios? If so what?

\* If indeed there was a "failure" what could be expected? Is it an excessive risk in any sense? i.e., health, \$, etc?

**Response:** The slope stability modeling was performed assuming that groundwater levels were at the mean seasonal high plus 2.2 feet. This is the highest that groundwater is expected to rise to during the design closure period. This groundwater surface roughly matches the surface topography for the critical slope cross-section, which is the highest possible level that groundwater could rise on a slope. Therefore, the slope stability modeling presented in the IM/IRA document already incorporates the potential negative effects of severe rainstorm conditions.

If there were a "failure" of the engineered cover system due to a slope stability problem, the primary outcome would be the cost impact associated with rehabilitating (e.g., regrading, compacting, material replacement) the cover and hillside. Due to the location of the engineered cover system and the low probability of people living next to the engineered cover, there is a low risk to human health. In the event of a failure of the engineered cover, the monitoring systems would detect the release of contaminants in the groundwater so that corrective actions could be implemented to avert any potential risks to the surrounding community and environment.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** There doesn't appear to be Worse Case or Failure Modes and Effects Analyses dealing with the health risks if the postulated performance of the closure fails. As a specific example, "when" the resident or worker of the future digs through the cover into the LLHW materials, which will surely happen, what health risks will be encountered? Knowing the "incidence per million" answer to this and other similar questions may help us establish an acceptable "moral burden" in making the near subjective decisions of "how clean is clean".

What are the top ten failure issues and their effects? . . .Top five?

**Response:** The commentor is correct in stating that the IM/IRA-EA Decision Document does not identify the various failure scenarios that were considered in the design of the closure system. To correct this omission, Section IV.2 (Design Basis) of the IM/IRA-EA Decision Document will be modified to include the significant failure scenarios and how they were addressed in the design. This discussion will include:

<u>Failure</u>	<u>Engineered Solution</u>
Slope Stability	Stabilize the hillside by regrading steep slopes, controlling surface water drainage, and installing a subsurface drain.
Erosion	Use pea gravel mulch and a topsoil/gravel mixture to minimize potential for erosion.
Flooding	Provide adequate drainage ditches surrounding the engineered cover to prevent flooding.
Differential Settlement	Prepare a homogeneous mixture of contaminated materials and compact the materials to a standard 95% proctor.
Groundwater Rise	Provide a subsurface drain.
Animals burrowing into the contaminated materials leaving a direct path for precipitation to contact material.	Install a biotic barrier.
Fire/Drought	Use natural Colorado prairie plant species.
Precipitation Infiltration	Slope the layers, provide an internal drainage layer, install a low-permeability layer, and install a post-closure monitoring system.

It should be noted that the risk to a person who excavates into the contaminated materials is not significant. The consolidated materials do not provide an acute risk (short-term exposure leading to health impacts). The consolidated materials would only cause adverse health impacts if an individual were exposed over a long period of time (chronic exposure). For this reason, the onsite resident scenario was used to establish the preliminary remediation goals.

**Action:** The IM/IRA-EA Decision Document will be modified as noted above.

.....

## I.2.6 MISCELLANEOUS SPECIFIC COMMENTS

The following miscellaneous specific comments were received.

**Comment:** The scope of this review process is well outside the limited capacity of Citizens Advisory Board members or staff to adequately address given the voluminous and technical nature of the documents that have been generated. If the DOE and regulators are truly interested in Citizens Advisory Board input, a technical reviewer(s) should be contracted by Citizens Advisory Board with DOE funds to technically review and comment on the IM/IRA and consult with Citizens Advisory Board members. Remember, there is an army of engineers and scientists working full time on the preparation and execution of this project for the DOE.

**Response:** DOE provides significant funds to the Citizens Advisory Board each year. The Citizens Advisory Board can allocate these funds in any way they choose. Technical Assistance Grants are also available from the EPA to assist in the technical review of a major technical document like the OU4 IM/IRA-EA Decision Document.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** "Dirty Closure" of the Solar Ponds sets a bad precedent for the future cleanup at Rocky Flats.

**Response:** DOE disagrees that "dirty closure" of the Ponds sets a bad precedent for the future cleanup of Rocky Flats. DOE, CDPHE, and EPA agree that closure in-place is a regulatorily acceptable method for closing surface impoundments. There are many sites in Colorado where in-place closures have been implemented. The proposed IM/IRA meets or exceeds the regulatory requirements for in-place closure.

DOE funded a public survey through the University of Colorado to investigate public opinion with respect to management of radioactive waste at the RFETS. A non-biased cross-section of the population indicated that the public generally considers that Rocky Flats provided an economic benefit to Colorado for more than 40 years, and that the wastes from these benefits are a Colorado problem which should be handled in Colorado. These survey results led DOE to include onsite closure as one of the remedial alternatives.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** What is the purpose of the 1,000-year requirement? Is it to assure ourselves that the problem is moved out of our generational time frame?

**Response:** The 1,000-year period of performance is a regulatory requirement specified in the Colorado Hazardous Waste Landfill Siting Criteria (6 CCR 1007-2 Part 2). The requirement is intended to provide reasonable assurance that a hazardous waste disposal facility is protective of human health and the environment for a period of 1,000 years or until the waste becomes innocuous.

The proposed IM/IRA design is a state-of-the-art engineered cover. DOE considers that the proposed IM/IRA is a permanent remedial action which will not have to be addressed by future generations. The proposed engineered cover is a robust design to last 1,000 years or longer. The durability requirement resulted in the use of all natural geologic/earthen materials that will function passively in consideration of the natural events that may occur.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** The Executive Summary should be written so to address the general public and not engineers or scientists.

**Response:** DOE agrees.

**Action:** DOE will modify the Executive Summary to address the general public.

.....  
**Comment:** How are you going to put safeguards on the cap against terrorists or undesirable groups that have a kind of agenda to blow it up or something like that?

**Response:** The contaminated pond materials do not contain sufficient quantities of special nuclear materials or other compounds which need to be protected against terrorist attacks. However, to prevent unauthorized entry, a fence will be installed around the engineered cover.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** At the Rocky Flats Summit the idea that some cleanup could be deferred in order to undertake mortgage reduction activities (as long as there is a binding commitment for DOE to come back to the cleanup) was widely accepted. DOE has indicated that it could utilize an extra \$35 million per year over the next two years in mortgage reduction activities. The current cleanup actions that are being considered for deferral are largely associated with the industrial area. The Solar Ponds will cost approximately \$35 million per year over the next two years.

DOE does not have a rational, publicly acceptable comprehensive plan for managing low-level radioactive wastes. The Solar Pond closure initiates an ad hoc approach to cleanup and waste management that does not have full public acceptance. Money is needed now for "mortgage reduction" activities. For these reasons Rocky Mountain Peace Center proposes:

- That DOE defer action on the Solar Ponds for two years (providing that the groundwater contamination does not present an imminent threat).
- That money from the Solar Ponds be put into mortgage reduction activities (with some money set aside to manage the sludge and pondcrete).
- That there begin an immediate public dialogue aimed at answering the important questions of how clean is clean and what should be done with the waste. The Citizens Advisory Board might convene such a dialogue.
- That there be an Environmental Impact Statement examining these questions; the Sitewide Environmental Impact Statement currently underway might suffice.

This effort would speed cleanup in the long-run (it will be easier to reach decisions with these questions answered), and free up money in the short-run to perform need mortgage reduction activities. It would also save money in the long-run, as much money is now "lost" due to the lack of a rational, comprehensive plan for managing wastes onsite (e.g. excessive costs for RCRA inspections because wastes are spread throughout the site, and excessive costs to heat pondcrete because it is in temporary tents). This, it can be seen that this effort would not delay cleanup in the long-run. Further, it might be possible for the dialogue referenced above to be structured in such a way that cleanup and waste management plans are developed along with the dialogue.

**Response:** DOE disagrees with this comment. The proposed IM/IRA will reduce the mortgage of Rocky Flats by closing the Solar Evaporation Ponds, removing Buildings 788 and 964, and disposing of pondcrete and sludge that are currently in storage. Approximately \$4-5 million is being spent to maintain and inspect these facilities each year. As stated in the comment "money is currently lost due to the lack of a rational, comprehensive plan for managing wastes onsite (e.g. excessive costs for RCRA inspections because wastes are spread throughout the site, and excessive costs to heat pondcrete because it is in temporary tents)." The proposed IM/IRA will eliminate the excessive cost for RCRA inspections and heating temporary tents for the storage of pondcrete since the pondcrete is proposed to be consolidated beneath the engineered cover. With the implementation of the proposed IM/IRA, DOE is striving to reduce the mortgage of the site thus allowing these funds to be expended on other remediation projects.

The Interagency Agreement and the IM/IRA-EA Decision Document provide the comprehensive plan for managing the contaminated OU4 materials. The closure of the Solar Evaporation Ponds is not an *ad hoc* approach to the cleanup of Rocky Flats, but conforms with regulatory requirements for the closure of these surface impoundments. As discussed in Section I.1.2 of this Responsiveness Summary, the public was given ample opportunity to provide comments on the Interagency Agreement and the IM/IRA-EA Decision Document. DOE does not consider that an Environmental Impact Statement is necessary. Section I.1.4 of this document provides a detailed discussion concerning this issue.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** Without an agreed to game plan/mission plan, how can you develop cleanup requirements for this site that will not be constantly subject to criticism? Without the "Final Use" of RFETS agreed to, all OUs and other cleanup activities must take the most conservative paths. Also, by not having the "Final Use" defined, developing an integrated plan for RFETS cleanup will continue to be disjointed, slow, costly, and subject to rework. Show how this IM/IRA fits into the high level requirements of RFETS cleanup. Are there any specific "Final Use" requirements for RFETS other than "Clean it up"?

**Response:** DOE disagrees with this comment. The proposed IM/IRA was developed according to the requirements of the Interagency Agreement which is considered to be the comprehensive "game plan" for remediation of Rocky Flats. Closing

and remediating the Solar Evaporation Ponds was considered to be a high priority project to reduce the overall risk posed by Rocky Flats. When these priorities were established it was recognized that some important remediation decisions, such as final land use, would not be available. However, DOE, EPA, and CDPHE agreed that certain remediation projects, including OU4, could occur independent of these decisions as long as the projects were developed using conservative assumptions. As sitewide remediation decisions are being finalized, some of the assumptions may have been overly conservative. However, DOE believes that these changes do not necessarily require rework since the proposed IM/IRA provides a level of protection that is greater than what may be required in sitewide remediation. The proposed IM/IRA would only be revised if it is determined that changes to the baseline may provide significant cost savings which could be reallocated to other remediation projects. These baseline requirements are identified in Part III (Section III.1 and III.2) of the IM/IRA-EA Decision Document.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.



**PART II**  
**REGULATORY AGENCY COMMENTS AND DOE RESPONSES**

## II.1 COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

This section addresses the general and specific comments provided by the CDPHE. As identified in the transmittal letter submitting these comments, the CDPHE comments are follow-ups to informal comments on a "roundtable" review document and the draft IM/IRA-EA Decision Document issued in February and May 1994, respectively. Therefore, the CDPHE review of the proposed IM/IRA-EA Decision Document was intended to verify the incorporation of initial comments, resolve any lingering concerns of the CDPHE, ascertain whether the comments of other parties as incorporated are acceptable, and thus ensure that the document adequately described the proposed action.

On March 24, 1995, the Division requested that additional sampling and analyses be conducted on the 4-8-inch layer of salt discovered during the removal of waste from Pond 207-C. This data, along with the Division's analysis of sludge data, is needed to confirm the adequacy of sludge characterization. Since the IM/IRA-EA Decision Document presents only a summary of the pond sludge characterization data, the CDPHE review and analysis of that data, relative to constituent concentrations and the protectiveness afforded by the proposed cover system, will be conducted outside the time constraints of the 60-day public comment period.

In reviewing the IM/IRA-EA Decision Document, the Division sought to tentatively identify conditions that will be included in a draft Class III permit modification to incorporate the closure into the Rocky Flats RCRA/Colorado Hazardous Waste Act (CHWA) permit. It is anticipated that most conditions will be addressed in the Title II design report as anticipated under the terms of the Interagency Agreement, Statement of Work, and schedule. The Division has not attempted to identify any conditions in these comments primarily on the basis that these comments are reserved to finalize the IM/IRA-EA Decision Document and, secondarily, the identification of permit conditions is merely preliminary.

### II.1.1 GENERAL COMMENTS

**COMMENT:** A final determination onsite suitability, relative to geotechnical integrity, must be made. To that end, DOE must analyze the seismic data derived from the Phase II RFI/RI investigation for evidence of rotational slumping in bedrock and investigate the occurrence and capability of an inferred fault potentially beneath the 207B series ponds.

**Response:** DOE is currently performing seismic refraction analysis as a component of the Phase II program. When these data are received, they will be analyzed with respect to evidence of rotational slumping in the bedrock. The results of the analysis will be included in the IM/IRA-EA Decision Document. In addition,

DOE is committed to performing a field study to confirm or deny the presence of an "inferred fault" in the vicinity of the OU4 Solar Evaporation Ponds. If the "inferred fault" is determined to exist, then DOE will continue the field study to determine if the fault is capable of future activity.

## II.1.2 SPECIFIC COMMENTS

**Comment:** Page ES-1: DOE previously and formally indicated its desire to annex IHSS 176; however, the Division has not approved the annexation. Although the Division is agreeable to the annexation, DOE has not indicated to what extent, if needed, the eastern portion of IHSS 176 will be remediated under the OU-4 action. Please do so.

**Response:** DOE considers that the IM/IRA-EA Decision Document is the mechanism for officially requesting that a portion of Individual Hazardous Substance Site (IHSS) 176 be annexed into OU4.

**Action:** The IM/IRA-EA Decision Document will be updated with the following paragraph: "The location IHSS 176 will impede the implementation of the OU4 engineered cover. Therefore, the DOE is requesting permission to annex a portion of IHSS 176 to the eastern coordinate of approximately E 22,350 that will be beneath the engineered cover. Any soils/debris identified during remediation activities as contaminated within this area will be consolidated with the IM/IRA remediation wastes."

**Comment:** Figure ES-1: Although true onsite disposal was not considered as an option (also see page ES-2, second paragraph), the practical application of the Corrective Action Management Unit rule, as it would be applied to OU-4, is in effect final disposal. Subsequent to issuance of the Proposed IM/IRA/EA DD, the Colorado Department of Public Health and Environment (CDPHE) wrote DOE indicating that onsite disposal is an appropriate alternative to consider. Therefore, Figure ES-1 and the narrative of the Final IM/IRA-EA Decision Document should reflect onsite disposal as a potential alternative.

**Response:** DOE agrees that onsite disposal is a variable remedial alternative. The inclusion of onsite disposal in the IM/IRA-EA Decision Document was discussed during the initial DOE, CDPHE, and EPA team meetings. This alternative was not included in the IM/IRA-EA Decision Document since it was believed at that time that the onsite disposal alternative would postpone closure of the Ponds for 5 to 10 years due to the amount of time required to site, design/permit, and construct

the onsite disposal facility. The onsite disposal facility alternative was also eliminated since DOE was not in a position to determine the overall disposal capacity needs for Rocky Flats.

Although DOE is actively considering CDPHE's letter to develop an onsite disposal facility for the final disposal waste generated during the remediation of Rocky Flats, DOE wishes to conduct this evaluation independent of the OU4 IM/IRA for DOE to meet its regulatory obligations for OU4 under the IAG. It should also be noted that in-place closure of the Ponds is allowed pursuant to 6 CCR 1007-3, 265.228 in lieu of developing a centralized landfill. Although the Corrective Action Management Unit (CAMU) is considered to be final disposal, CAMUs are excluded from the definitions for "disposal facility" and "landfill." The CAMU regulations were specifically promulgated to expedite corrective actions similar to the situation at OU4. Based on the above, DOE does not wish to delay implementation of a regulatorily allowable solution in the speculation that an onsite disposal facility will be developed. Therefore, DOE recommends that the onsite disposal alternative should not be added to the IM/IRA-EA Decision Document. Should significant progress be made on development of the onsite disposal facility, DOE will reassess its decision to proceed with the proposed IM/IRA at that time.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

**Comment:** Introduction: The last paragraph of Page I-2, should include clarification that Unit 24 (Building 964) is covered by an approved closure plan but that the final closure of Unit 24 (concrete slab and soils, if contaminated) will be deferred to the OU-4 schedule and constitute a clean closure of the unit. (Removal of the concrete slab, and any soil contaminated from Unit 24 activities, would in fact be a clean closure of the unit followed by inclusion of the resulting waste in the CAMU.)

**Response:** DOE agrees.

**Action:** The text on page I-2 and throughout the document as appropriate will be revised to reflect that Building 964 is covered by an approved closure plan. The text will also indicate that remediation of the concrete slab and associated soils will be accomplished during OU4 remediation efforts.

**Comment:** Section I.2: On page I-10, as a bulleted item, include evaporator salts from Building 374. These wastes were placed in Pond 207-C, at least once, when saltcreting operations in B374 were interrupted.

**Response:** DOE agrees.

**Action:** Bulleted lists will be revised to include Building 374 evaporator salts.

.....  
**Comment:** Section I.2.1.2: In the fourth paragraph, Page I-14, the statement is made that placement of wastes in SEP 207-A ceased and dewatering and sludge removal was initiated in 1986. However, in the last paragraph, Page I-6, states that removal of sludge began on June 19, 1985. Please clarify and amend the text as appropriate.

**Response:** The removal of sludge from the SEPs commenced during 1986.

**Action:** The document will be updated to reflect the 1986 date and delete the June 19, 1995 date.

.....  
**Comment:** Section I.2.2: The SEPs are illegal storage units. The SEPs lost interim status on November 8, 1985 (one year after the effective date of HSWA) after failing to certify compliance with applicable ground water monitoring requirements of Part 265, Sub-part F in a timely manner. Despite this failure to comply, the SEPs remain subject to interim status regulations of 6 CCR 1007-3, Part 265 (§265.1(b)). Please clarify these facts.

**Response:** DOE agrees that the Ponds are being closed and remediated pursuant to the Interagency Agreement and in accordance with the interim status regulations for surface impoundments. The document will be clarified.

**Action:** The text of the IM/IRA-EA Decision Document will be revised as follows: "The SEPs are currently being closed under RCRA interim status regulations for surface impoundments and remediated under the terms of the IAG."

.....  
**Comment:** Section I.2.2.1: In the fourth paragraph, page I-17, B910 has never routinely processed Interceptor Trench System (ITS) waters. The use of B910 was limited to hot tests only. Please clarify.

**Response:** The text will be revised to reflect that Building 910 did not routinely process ITS water. The associated piping within Building 910 was used on occasion to transfer the ITS water to Building 374 for processing.

**Action:** The text shall be revised to state, "The associated piping within Building 910 was used on occasion to transfer the ITS water to Building 374 for processing."

**Comment:** Section I.2.2.2: See previous comment on the Introduction regarding the approved closure plan for Building 964.

**Response:** DOE agrees.

**Action:** The text will be revised per the previous comment response.

**Comment:** Section I.3.1: A public meeting, not public hearing, was held on March 22, 1995. The Division may call a public hearing when the draft permit, relative to this Class III permit modification, is opened to a 45-day public comment period. (DOE took formal comments at the March 22nd meeting; however, this did not constitute a hearing.)

**Response:** DOE agrees.

**Action:** The text will be revised to indicate that a formal "public comment" meeting occurred, and not a "public hearing."

**Comment:** Section I.3.2: In the first paragraph, please indicate the percentage of data validation and the appropriate date. If the data validation process is not yet complete, please specify the date of expected completion.

**Response:** DOE considers that the data validation information provided in the IM/IRA-EA Decision Document should not be revised because these were data that were statistically analyzed to determine the potential constituents of concern (PCOCs) and used throughout the document. However, the text will be revised to indicate that the characterization data were subsequently validated and that no changes to the identified PCOCs are required.

**Action:** Text of the IM/IRA-EA Decision Document will be revised per the above response.

**Comment:** Section II.1: The wastes cited in the second paragraph, Page II.1-1, should include salts from the Building 374 evaporator. Please refer to the comment on Part I, Section I.2.

**Response:** Although neither salts nor Building 374 are specifically addressed in the second paragraph, information in Appendix II.A contains various salt-related elements. The second paragraph is intended to address routinely discharged substances into the SEPs. The placement of salts from Building 374 seems to be on a more discrete basis. Inclusion of salts from Building 374 into this paragraph does not seem appropriate, unless these particular salts are the major portion of the sludge from SEP 207-C.

**Action:** The paragraph on page II.1-1 will be modified to state the wastes that were "routinely" dispositioned in SEP 207-C.

.....  
**Comment:** Section II.1.2: In the first paragraph, Page II.1-4, please clarify that drilling beneath Pond 207-B-south is not planned (the liner of this pond demonstrated integrity that preclude the need for additional RFI/RI investigation); however, the nature of waste stored in Pond 207-C was such that drilling will be conducted to support the proposed closure action.

**Response:** DOE agrees.

**Action:** DOE will clarify by rewriting the sentence as "SEP 207-B South and 207-C currently contain liquids and sludges and will be investigated at a later date.'

.....  
**Comment:** Section II.3.5.3: In regard to the first and second paragraphs of this section, page II.3-98, the Division does not believe that sufficient information is available to interpret the "closed contour highs" as slump blocks. A rolling bedrock topographic surface, coupled with erosion of ancestral Walnut Creek could easily account for these two features. Nevertheless, the potential impact of existing or potential slumps should continue to be analyzed from the Phase II seismic data as discussed at the OU-4 Team meeting of March 29, 1995. Additionally, the investigation of an inferred fault, with potential impact onsite suitability, should be completed as soon as possible under the Phase II RFI/RI investigation program.

**Response:** The enclosed bedrock highs were interpreted to be slump blocks. The interpretation was based upon current knowledge and to draw attention to the potential for slump blocks. Subsequently, three geotechnical boreholes were

drilled specifically to investigate the potential for basal shear planes. The lack of the shear planes in these boreholes refutes the interpretation and adds additional control. With the Phase II seismic data and additional well control, a better bedrock topography map will be presented in the Phase II Report. A field program will be initiated by DOE to assess the presence and capability of the "inferred fault."

**Action:** The text of the IM/IRA-EA Decision Document and bedrock topography map will be revised.

.....  
**Comment:** Figure II.4.4-27: There are no data to support an uncontaminated corridor coincident to the PA security fence. Therefore, the two largest areas should be combined in to one area of contamination. Please check each of the extent of contamination maps for similar problems.

**Response:** DOE agrees.

**Action:** This figure will be changed. The other figures in this section are correct.

.....  
**Comment:** Section II.5.2.2.1: It appears that the statement in the first paragraph, Page II.5-9, "Pu(IV), which exists as Pu(IV)...." should begin with "Plutonium" not "Pu(IV)".

**Response:** DOE agrees.

**Action:** The text will be revised to "Plutonium."

.....  
**Comment:** (Part III - Introduction) DOE's interpretation, first paragraph page III-1, that closure of the SEPs should include all types of waste, particularly pondcrete, is incorrect. In regard to pondcrete, DOE clearly took the action to remove waste from a storage unit, treat the waste, and ship the waste to the Nevada Test Site for disposal. The action to remove and treat the sludge continued after NTS stopped accepting mixed waste. Off-site disposal was the closure action of choice implemented by DOE, does not constitute a remediation waste as defined under the Corrective Action Management Unit Rule and is, therefore, not eligible for disposition in a CAMU. (Further clarification of the Division's interpretation of the CAMU rule is being prepared for submittal to DOE.)

**Response:** DOE has re-examined the inclusion of pondcrete as remediation waste. The CAMU regulations and remediation waste definition were promulgated by



Colorado in June, 1994; the regulations could not, therefore, be applied prior to that date. The State has acknowledged that sludge wastes that existed prior to June, 1994 meet the definition of remediation waste. The State has verbally informed DOE that no further clarification of this comment will be available.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** Section III.1: The first paragraph of the section states that the closure action is intended to "...disposition the OU-4 sludges, pondcrete, and Buildings 788 and 964 and their ancillary equipment." Clearly, this is DOE's intent whether or not the inclusion of pondcrete is legal. DOE has repeatedly been informed in OU-4 Team meetings that pondcrete is not remediation waste as defined by the CAMU Rule (sludge qualifies as remediation waste). Nevertheless, DOE insisted on taking the issue before the public despite the Division's interpretations. This narrative should be revised to reflect the more restrictive role of unit closures.

**Response:** DOE intends to close the Solar Evaporation Ponds in full compliance with all applicable laws and regulations. DOE has received the State's comment on pondcrete (see the preceding comment) and provided a response. The paragraph in question correctly states the purpose of the OU4 IM/IRA program which includes closure, remediation, and disposition of materials.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** Section III.2.3.1: In the second paragraph, the statement is made that COCs may migrate in sufficient quantities to cause ground water criteria to be exceeded. Clarification should be made that this assumes a no action alternative.

**Response:** The text in this section will be changed to reflect that the assumed catastrophic dissolution of OU4 soil contaminants used in the MYGRT model was representative of potential contaminant migration into the groundwater under the No Action GRA.

**Action:** The fourth paragraph, first sentence of page III-15 will have the words "under the No Action GRA" inserted between the existing words "exists for."

.....

**Comment:** Section III.3.3.1: In the first paragraph, page III-73, a statement is made that sludge would remain in the storage tanks under a no-action GRA. DOE is reminded that the sludge is land disposal restriction (LDR) non-compliant waste such that treatment to a Best Demonstrated Available Technology (BDAT) would be necessary for ongoing storage even if the 750 Pad is permitted for storage of liquified waste.

**Response:** DOE agrees. The text in this section will be changed to include the fact that sludge, if stored under the No Action GRA, will be treated to comply with LDR requirements.

**Action:** The first paragraph, fourth sentence of page III-73 will be changed so that the words "remain in the storage tanks" at the end of the sentence will be replaced with "be pumped from the sludge storage tanks and treated to comply with LDR requirements."

The rough-order-of-magnitude cost estimate for GRA I will be revised to include the costs associated with sludge treatment.

.....  
**Comment:** Section III.5.2: In the second paragraph, page III-111, change "development of a hazardous waste management site" to "development of a Corrective Action Management Unit (CAMU) as an onsite response action." On page III-117 (next to last paragraph), the Hazardous Materials and Waste Management Division, not the Colorado Hazardous Waste Control Commission, may designate a CAMU.

**Response:** DOE agrees.

**Action:** The second paragraph, second sentence of page III-111 will be changed so that the words "hazardous waste management site" will be replaced by "Corrective Action Management Unit (CAMU)."

The fourth paragraph, fourth sentence of page III-117 will be changed so that the words "Colorado Hazardous Waste Commission" will be replaced with "Hazardous Materials and Waste Management Division."

.....  
**Comment:** Section IV.3.1.3.4: In the second paragraph, Page IV-65, please provide a metric equivalent for the percolation rate of 0.1 inches/year value. This may help facilitate a lay understanding of the interrelationship between the expected rate of percolation through the cover and the rate sufficient to protect ground

water. Additionally, clarify that a rate equal to or less than  $1 \times 10^{-7}$  cm/s is the desired threshold needed to provide protection of ground water resources.

**Response:** The original value of 0.1 inches/year was an error. The model percolation results shown in Table IV.3-8 are all below 0.01 inches/year and will be reiterated in the text. An equivalent metric-unit-of-measure infiltration rate will be shown in parentheses after the English unit of measure. The established maximum acceptable leaching rate value will be clarified.

**Action:** The IM/IRA-EA Decision Document will be modified so that the percolation value of "0.1 inches/year" will be replaced with "0.01 inches/year ( $8.1 \times 10^{-10}$  cm/s)."

The second paragraph, third sentence of page IV-65 will be replaced with "Leach modeling results presented in Section 10.4 indicate that acceptable leachate concentrations are anticipated under normal expected conditions as well as under stress conditions."

**Comment:** Section IV.3.1.4: The second paragraph of the section indicates that soils, liners, processed sludge, etc. will be blended to form a homogeneous material for disposition under the engineered cover. The document does not provide, even in general terms (subject to detailed design under Title II), a discussion on how this will be accomplished. This is an important factor since modeling scenarios are based upon this homogeneity. The Final IM/IRA-EA Decision Document must provide the basic process and be detailed in the Title II design.

**Response:** The methods for mixing the OU4 contaminated materials are addressed in Section IV.6.5 of the IM/IRA-EA Decision Document. This section states that the contaminated materials will be blended to provide a mixture with homogeneous physical characteristics. The contaminated materials will be mixed on the basis of their relative individual volumes with respect to the total volume of contaminated materials to be consolidated under the engineered cover. Based on current estimates, the volume of materials to be consolidated under the engineered cover are as follows (see page IV-116 of the IM/IRA-EA Decision Document):

• SEP A and B Soils	92,200 cubic yards (yd <sup>3</sup> )	(77.5%)
• Processed Pondcrete	10,000 yd <sup>3</sup>	(8.4%)
• Processed Sludge	5,000 yd <sup>3</sup>	(4.2%)
• Crushed Liners	11,800 yd <sup>3</sup>	(9.9%)

The percentages in parentheses provide the relative volume ratios for the blended consolidated materials to achieve a homogeneous mixture. The ratios provided above are targets and will vary on the relative total volume of OU4 materials to be consolidated. The overall objective of the blending is to attain a mixture that is as homogeneous as possible with respect to the physical characteristics for compaction and settlement.

The equipment and operating procedures used to blend the contaminated materials were not specified in the IM/IRA-EA Decision Document to allow the construction subcontractor to choose blending methods and equipment. The construction subcontractor will be responsible for meeting project design criteria and OU4 waste acceptance criteria through compliance with performance specifications.

**Action:** The following sentence will be added to the last paragraph, after the second sentence of page IV-65: "Homogeneity of the blended consolidated materials will be achieved by mixing the materials in volume ratios averaged over the total estimated volume for the materials to be consolidated under the engineered cover."

The following section will be added to the Design Basis Assumptions:

"IV.2.6.x The consolidated contaminated materials to be consolidated under the final engineered cover will be blended to achieve a mixture with homogeneous physical characteristics. The contaminated materials will be mixed on the basis of their relative individual volumes with respect to the total volume of contaminated materials to be consolidated under the engineered cover. Based on current estimates, the volume of materials to be consolidated under the engineered cover are as follows:

• SEP A and B Soils	92,200 yd <sup>3</sup>	(77.5%)
• Processed Pondcrete	10,000 yd <sup>3</sup>	(8.4%)
• Processed Sludge	5,000 yd <sup>3</sup>	(4.2%)
• Crushed Liners	11,800 yd <sup>3</sup>	(9.9%)

The percentages in parentheses provide the relative volume ratios for the blended consolidated materials to achieve a homogeneous mixture. The ratios provided above are targets and will vary on the relative total volume of OU4 materials to be consolidated."

.....

**Comment:** Section IV.3.1.5: In the last paragraph of the section, Page IV-67, please clarify that the overall thickness of the drainage layer, not the gravel layer alone, will be 2.5 feet thick.

**Response:** The thickness of the drainage layer will be clarified.

**Action:** The second paragraph, first sentence of page IV-67 will be revised so that the words "2.5-foot thick gravel layer with bottom elevations corresponding" will be replaced with "3-foot (total thickness) drainage layer consisting of a central 1-foot thick gravel layer sandwiched between graded sand layers: The bottom elevation will correspond..."

.....  
**Comment:** Section IV.3.2.3: The Division assumes that decontamination of metal sheeting and beams will be conducted at an existing decon station rather than at the site of Building 964. The Division in an OU-4 Team meeting, relative to Building 788, indicated the acceptability of this approach. Please note this intent in this section and verify that Section IV.3.2.2, for the closure of Building 788, contains similar language.

**Response:** It has been the intent of the IM/IRA to perform decontamination operations at the existing Protected Area Decontamination (PAD) Facility. Additional text will be added to Sections 3.2.2 and 3.2.3 stating that decontamination activities will be performed at the PAD Facility.

**Action:** The following sentence will be added to the end of the first paragraph on page IV-70 and to the end of the second paragraph on page IV-72, "Staged debris and waste materials that are capable of being decontaminated will be packaged and transported to the Protected Area Decontamination Facility for decontamination."

.....  
**Comment:** Section IV.6.3: The "Project Milestones" listed should include a date for submittal of a RCRA post closure care and monitoring permit to validate and support the December 99 "Post Closure System Start-up." This will better ensure that the proper administrative process is scheduled.

**Response:** DOE agrees.

**Action:** A post-closure system startup milestone date will be added to the list of milestones. DOE will identify the milestone date that is developed as a function of the 90% design.

.....

**Comment:** Section IV.10.7.3: A statement is made in the last paragraph, page IV-173, that the effects of site characteristics (item number 5) cannot be addressed without site specific field data. Of the site characteristics listed, soil composition and thickness, bedrock, water table and topography, which are not available, or not sufficiently available, to determine the effects of earthquakes?

**Response:** The site characteristics of soil composition and thickness, bedrock, water table, and topography are known from the Phase I RFI/RI studies. However, these site characteristics can impact the intensity and effects of the seismic event. It is unknown whether the site characteristics will result in the amplification, scattering, or absorption of seismic energy. Site-specific field data are necessary to determine how the site characteristics will affect a seismic event. These data will be measured or modeled as a result of the seismic field investigations that will be conducted.

**Action:** The last paragraph, second sentence of page IV-173 will be revised so that the word "known" is inserted after the words "The effects of." The text will be clarified to state that field data are needed to assess how the known site characteristics will impact the energy dissipation from a seismic event.

.....  
**Comment:** Section IV.11: In the second paragraph, please indicate that CAMU has been adopted by the State.

**Response:** DOE agrees.

**Action:** The text will be changed to specify that the CAMU regulation has been adopted by the State of Colorado.

.....  
**Comment:** Section IV.11.1: In the first paragraph, page IV-198, submittal of an actual post closure care and monitoring permit is not required by the Division, and cannot be approved, until the closure is completed. Therefore, DOE's intent to submit an actual post-closure care and monitoring plan (versus part V of this document) prior to closure of the SEPs is inappropriate. However, the Division recognizes the need to place monitoring equipment in the cover at the time of construction rather than retrofit monitoring equipment to the cover and is prepared to act upon that portion of the monitoring plan via the IM/IRA-EA Decision Document approval process.

**Response:** Part V of the IM/IRA-EA Decision Document identifies the post-closure care requirements to fulfill the interim status plan requirements. These provisions will

be supplemented with the submittal of a post-closure permit application which will be submitted to CDPHE following the completion of closure. The post-closure permit application will be prepared to fulfill the monitoring and maintenance requirements specified in 6 CCR 1007-3, 264, Subpart F. Therefore, Part V of this IM/IRA-EA Decision Document was developed to ensure compliance with the requirements of 6 CCR 1007-3, 264. The closure monitoring activities will be established based on the final approved post-closure permit.

**Action:** Section IV.11.1 will be revised per the comment response.

**Comment:** Section IV.11.4: DOE's position, as stated in the last paragraph of page IV-199, that pondcrete is not considered "new or as generated waste" will not support the inclusion of pondcrete into a CAMU. Pondcrete operations prior to January 22, 1991 were not conducted under a corrective action authority and the resulting pondcrete cannot be defined as remediation waste. The Division will clarify this determination in a subsequent letter.

**Response:** DOE has re-examined the definition of remediation waste. Colorado regulation 6 CCR 1007-3 260.10 specifies that remediation wastes are wastes that are managed for the purpose of implementing corrective action requirements. The commentor's reference to a corrective action authority is not included in the definition. Pondcrete was generated for the purpose of implementing corrective action at the ponds and has since been managed for that purpose. The pondcrete was the product of cementing pond sludge. Pond sludge that was not cemented but remained in the ponds has been accepted by the State as meeting the definition of remediation waste. DOE finds that pondcrete meets the definition of remediation waste. The State has verbally informed DOE that no further clarification of the pondcrete comment will be available, so DOE plans no further response.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

**Comment:** Table IV.11-2: Relative to paragraph 2.4.7, page IV-208, the "Implementation/ Compliance Strategy" states that leachate collection is not needed to prevent contaminant migration to ground water. Be advised that the Part 2 siting requirements do not specify leachate collection. Leachate control, to prevent leachate generation, is acceptable. Please review each paragraph citation of Table IV.11-2 and state that leachate control is provided through the proposed cover system. Relative to paragraph 2.4.9, please see the comment to Section IV.11.1

regarding the appropriate sequence for submittal of the post-closure care and monitoring plan. Please amend other citations as appropriate. Relative to citation 2.5.5, the requirement should state the need for "leachate and runoff control" not leachate collection.

**Response:** DOE agrees.

**Action:** Table IV.11-2 will be revised to correct references of a leachate collection system to leachate control. Section 2.4.9 will be modified to state that Part V is the interim status Post-Closure Plan, and that a Post-Closure Permit will be submitted upon completion of closure. Section 2.5.5 will be modified to delete "leachate collection and runoff control" and add "leachate and runoff control."

**Comment:** Section IV.11.4.2: Although approval of the IM/IRA/EA DD, without change to the CAMU proposal, may be a precursor to designation of a CAMU, actual approval of CAMU would occur upon modification of the facility's permit by the Division. Please remove or modify the statement "With the approval of this decision document, CDPHE approves the CAMU."

**Response:** DOE agrees.

**Action:** The text pertaining to approval of the IM/IRA-EA Decision Document constituting the approval of the CAMU will be modified as follows: "To implement the chosen remedial alternative, the IM/IRA-EA Decision Document needs to be approved by EPA and CDPHE and a RCRA/CHWA permit modification for the CAMU and Subpart X treatment facility needs to be issued by CDPHE. To maintain the project schedule, the RCRA/CHWA permit modification is being processed concurrently with the IM/IRA-EA Decision Document. Any delays to either the approval of the IM/IRA-EA Decision Document or the issuance of the permit modification may significantly impact the project schedule."

**Comment:** Section IV.11.5: As expressed in OU-4 Team meetings, the sludge processing unit does not appear to qualify as a TU. TUs are limited to tanks and containers. Moreover, the preamble to the federal CAMU/TU rule specifically discusses treatment units are more suited to Sub-part X units. The Division will determine, with DOE input, the appropriate permitting mechanism in the process of preparing a draft permit modification for the closure action.

**Response:** DOE agrees.



**Action:** The IM/IRA will be modified to request a Subpart X permit for the sludge and pondcrete treatment units.

.....  
**Comment:** Table IV.11-3: This table, under CAMU Permit Requirement No. 3 (page IV-219) once again indicates that the post-closure care and monitoring permit application will be submitted prior to the closure of the SEPs. Please see the comment to Section IV.11.1.

**Response:** Per CDPHE's request, DOE intends to submit the post-closure permit application after closing the SEPs.

**Action:** The table will be revised to change "prior to closure of the SEPs" to "after closure of the SEPs."

.....  
**Comment:** Appendix IV.F: Under the heading "Crushing and Excavation of Liners from SEPs" (Page IV.F-5), where, and by what methods, will crushing of liners be performed. The process may necessitate additional permitting actions including compliance with air pollution regulations.

Under the heading "Closure of Existing of Underground Utilities" (Page IV.F-6), two possible closure scenarios are discussed, removal or filling with cement. When will DOE determine which approach will be used? Will some pipes be removed while others are sealed? What are the criteria that will be used to determine the actual closure approach?

**Response:** DOE envisions the use of a rotomil for crushing/removing the liners, and conveying them into a dump truck for transport to the material mixing area. The liner removal operation will be performed within a contained system which should minimize the production of dust. A water mist spray bar will be mounted on the end of the conveyor where the crushed asphalt is deposited into the dump truck. DOE will address the need for an air permit with respect to the selected processing equipment. DOE also notes that Paragraph 121 of the Interagency Agreement may exempt the need to obtain the actual air permit for the short-term operation.

Removal will be by means of utility line closure. This method will be used because the area beneath the engineered cover will be excavated to the depth of the mean seasonal high water table elevation. The utility closure in-place method will therefore not be feasible.

**Action:** The IM/IRA-EA Decision Document will be modified to include the above discussions.

.....  
**Comment:** Section V.1.2: At the end of the last sentence of this section, page V-3, change the text to read "... indicate a design or construction problem."

**Response:** DOE agrees.

**Action:** The text will be modified as requested.

.....  
**Comment:** Section V.2.1: Relative to a statement in the third paragraph, page V-5, the SEPs lost interim status by failing to comply with Part 265, Sub-part F monitoring requirements in a timely manner. Nevertheless, closure must be conducted under the Part 265 regulations. Please modify the statement to reflect the true legal status of the SEPs. Additionally, the IM/IRA-EA Decision Document is intended to be equivalent to a RCRA/CHWA closure plan. The plan is not the State's plan, it is DOE's closure plan.

**Response:** DOE believes that whether or not the SEPs lost interim status is not germane to the IM/IRA-EA Decision Document. The SEPs are being closed and remediated pursuant to the Interagency Agreement. The closure is being conducted in accordance with the interim status regulations for surface impoundments. DOE agrees that the IM/IRA-EA Decision Document is intended to be equivalent to a RCRA/CHWA closure plan prepared and implemented by DOE.

**Action:** The text in the third paragraph will be replaced with the following: "The IAG outlines the regulatory process which satisfies the requirements of these environmental acts (Table 6 in the IAG). The closure of the SEPs is being conducted in accordance with the interim status regulations for surface impoundments (i.e., 6 CCR 1007-3, 265 Subparts G and K). The IM/IRA-EA Decision Document is intended to be equivalent to the RCRA/CHWA closure and post-closure plans that are required to be submitted to CDPHE in accordance with 6 CCR 1007-3, 265.112 and 265.118. Part V of the IM/IRA-EA Decision Document identifies the post-closure care requirements to fulfill the interim status plan requirements. These provisions will be supplemented with the submittal of a post-closure permit application which will be submitted to CDPHE following the completion of closure. The post-closure permit application will be prepared to fulfill the monitoring and maintenance requirements specified in 6 CCR 1007-3, 264, Subpart F. As such, Part V of this IM/IRA-EA Decision Document

was developed to ensure compliance with the requirements of 6 CCR 1007-3, 264."

.....  
**Comment:** Section V.4.2.1: The description of the location of the Neutron probe access tubes, in the first paragraph, is unclear and misleading. The Division suggests, at the minimum, that "at the top of the subsurface drain layer" be deleted. As now described the waste pile would extend vertically into or below the subsurface drainage layer. The Neutron probe access tubes are to be located 2 feet above the top of subsurface drain which will place them 2 feet above the base of the waste pile.

**Response:** DOE agrees.

**Action:** The text will be revised to more clearly describe the location of the neutron probe access tubes as 2 feet above the bottom of the waste pile, which is also 2 feet above the top of the subsurface drainage layer.

.....  
**Comment:** Section V.5.2.4: Relative to monitoring frequency, or future reductions, the Division reserves judgement to a review of the actual post-closure and monitoring permit application following closure of the SEPs.

**Response:** DOE agrees. The Division will have the opportunity to comment on the particulars of the post-closure monitoring program when the post-closure care permit application is submitted by DOE. In addition, all data collected during post-closure monitoring will be submitted to the Division for review prior to any modifications in the monitoring program.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** Section V.5.2.7: As stated in the comment to Section V.2.1, the SEPs previously lost interim status. Please replace the statement about termination of interim status with reference to closure completion or certification of closure.

**Response:** The current regulatory status of the solar evaporation ponds is not germane to the IM/IRA-EA Decision Document. The references to interim status will be deleted.

**Action:** The text will be modified to delete, "which are regulated as interim-status units" and "interim-status is terminated and."

.....

**Comment:** Section V.5.3.5: See comment to Section V.2.1 relative to loss of interim status.

**Response:** The current regulatory status of the solar evaporation ponds is not germane to the IM/IRA-EA Decision Document. The references to interim status will be deleted.

**Action:** The text will be modified to delete "which are regulated as interim-status units" and "interim-status is terminated and."

## II.2 U.S. ENVIRONMENTAL PROTECTION AGENCY

This section addresses the general and specific comments provided by the EPA. The EPA indicates in their transmittal letter that significant technical and policy issues remain outstanding in light of ongoing deliberation regarding development of an overall strategy for RFETS. EPA believes that the agencies should meet to discuss these specific issues to ensure that the OU4 approach is coordinated with the overall strategy.

The EPA comments are divided into critical comments (Section II.2.1), general comments (Section II.2.2), and specific comments (Section II.2.3).

### II.2.1 CRITICAL COMMENTS

**Comment:** 1. EPA is very concerned about the potential slope instabilities of the northern hillside in the engineering cover location. The conclusions presented in the IM/IRA from the geotechnical investigation and XSTABL modeling indicates that the northern hillside is stable. However, EPA feels that these conclusions are highly questionable.

The previous studies mentioned in the specific comments have provided physical evidence that slumping on the hillside has occurred in the past. Therefore, it is reasonable to assume that the hillside is unstable and that future slumping is possible. EPA feels that it would be difficult to insure that the northern hillside will be stable for 1,000 years. Therefore, EPA is unable to concur with the proposed engineering cover design at this time.

EPA requests that the engineering design include alternatives to overcome any stability problems in the northern hillside. EPA's comments on this issue are presented in the Specific Comments section.

**Response:** Based on the information currently available for the site conditions and the slope stability analyses as presented in the IM/IRA document, it appears that the upper portion of the hillside north of the proposed engineered cover location is stable. This conclusion will be reevaluated for the 90% design by means of further modeling. New information such as results of the seismic investigation report will be incorporated in the modeling. In addition, the potential for progressive slope failure from the lower portion of the north hillside (i.e., the slope immediately above North Walnut Creek) will be evaluated. Alternatives for stabilizing the north hillside slope (e.g., drilled piers, grouting) have been

considered and will be evaluated in greater detail depending on results of the modeling performed for the 90% design.

**Action:** DOE will re-evaluate the XSTABL modeling for the 90% design with additional data. Hillside stabilizing alternatives will be evaluated if necessary based on the revised XSTABL results.

.....  
**Comment:** 2. EPA was not able to concur with the proposed sludge and pondcrete processing alternative. EPA feels that this particular alternative goes beyond the necessary and sufficient requirements. The possible application of a CAMU scenario for waste consolidation may relax Land Disposal Requirements (LDRs) for treatment. Therefore, EPA believes that the treatment requirement for the sludge and pondcrete should be simple dewatering. EPA also believes that dewatering can be accomplished using more simple and economic alternatives. The estimated cost associated with proposed processing option is higher than the estimated cost associated with the overall construction of the engineering cover. Therefore, EPA finds this action hard to be justified in light of the fact that the sludge and pondcrete represent only about 10% of the total waste to be consolidated under the engineering cover.

**Response:** DOE concurs that dewatering is required for sludge and pondcrete, but treatment to LDR compliance is not required. DOE has evaluated a number of dewatering processes and finds cementation to be the most cost effective alternative. An economic measure of the cost-effectiveness of the proposal is more informative than the cost percentage of the total volume suggested by the EPA. A cost savings of approximately \$100 million will be realized when compared to off-site disposal costs.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**II.2.2 GENERAL COMMENTS**

**Comment:** 1. The relevance of the Waste Acceptance Criteria (WAC) requirements for OU 4 sludge is vague. It is not clear why other options (such as sludge dewatering followed by mixing with OU 4 soils prior to consolidation under cover) are not satisfactory as pretreatment. The additional benefits gained by using the sludge treatment process discussed in Section IV.3.5 should be

explained because sludge treatment costs (\$13 million) represent 12 percent of the total costs (\$107 million).

**Response:** DOE concurs that the document fails to explain the use and benefit of the WAC. The WAC included in the document are intended to ensure that three goals are achieved:

1) Groundwater is protected. The last criterion, which discusses demonstrating protectiveness through modeling, provides for the protection of groundwater. A second criterion prohibits the use of any reagents that might invalidate the analyses used to demonstrate protectiveness.

2) No free liquids will be placed in the closure. This goal derives from a requirement in 40 CFR 265.228(2)(1) to eliminate free liquids by removing liquid wastes or solidifying the waste. Free liquids exist in the pondcrete and could be released by rushing and placement of pondcrete during construction. EPA's suggestion to mix the crushed pondcrete, with its free liquid, into the OU4 soil has been evaluated. Although modeling was not performed, the soil mixing would probably initially achieve groundwater protectiveness since the free liquid would be held up on the soil pore spaces. However, over time, free liquids will likely drain from the consolidated soils. DOE felt that such a placement could be challenged as failure to meet the free-liquid prohibition. Since most of the costs are incurred by the crushing and mixing operation, which are the same whether soil or reagent (such as cement) is used to bind the free liquids, DOE judged the use of reagent to be a cost-effective method to ensure compliance.

3) Provide a treated waste form that is easy to handle in the construction. Most of the WAC items address this goal, which is expected to save time and money. This decision was made based on a "common-sense" inspection of the design and construction plans. As EPA correctly noted, some size reduction is necessary to achieve compaction and reduce differential settlement; a nominal 3-inch mesh size will be effective. Control of fugitive dust will be important to construction; a criterion for resisting wind dispersal was included. Whether the size reduction occurs inside or outside the construction zone is a detail of logistics. However, storage space on the construction site will be limited and a requirement for "just-in-time" delivery is included. Any increase in personal protective equipment (PPE) requirements for construction workers would increase construction costs; therefore, a prohibition on pathogens is included. Any reagent that could result in gas generation would put the engineered cover design into question. Therefore, a prohibition against gas generation is included. Finally, if the volume

of material produced were to exceed the 60% design basis of about 20,000 cubic yards, costly re-work of the cover design could be required. This is the reason why the design criterion for volume was included.

**Action:** The WAC will be rearranged into three groups to reflect the discussion above. The "monolithic" criteria will be deleted, since they are redundant with the "particulate" criteria and are overly detailed. The criterion for group three, ease of handling during construction, will be consolidated to remove excessive detail.

**Comment:** 2. Pondcrete is SEP 207-A sludge that has been solidified into a concrete matrix. It is not clear why pondcrete requires further treatment before it can be disposed of beneath the engineered cover. WAC have been identified as standards that both pondcrete and sludge must meet prior to disposal beneath the cover. However, it is not clear what threat will be mitigated by requiring pondcrete to meet all the WAC prior to disposal. Some degree of size reduction may be necessary to achieve compaction and reduce differential settlement; however, several of the other treatment steps appear unnecessary. Pondcrete treatment costs represent 27 percent (\$29 million) of the total cost (\$107 million), but the document does not discuss the benefits of this treatment expenditure. It seems that costs could probably be reduced by taking advantage of the treatment process already completed for pondcrete. For example, size reduction followed by mixing with OU4 soils may be sufficient for pondcrete.

**Response:** Existing inventory pondcrete has, in some cases, degraded into a semi-liquid state that will not pass a paint filter test for free liquids unless it is reprocessed. It is uncertain whether the remainder of the inventory, if left untreated, will not undergo similar degradation. Since at least some of the inventory pondcrete has undergone a change in phase, it will require processing in a manner similar to the sludge.

DOE considered EPA's suggestion for mixing crushed pondcrete with OU4 soils. As mentioned above, this approach could be interpreted as placing potential free liquids in the closure, which is undesirable. In addition, if quality control problems were to arise, then closure construction would be interrupted. DOE considers that the proposed approach to pondcrete treatment provides better cost and construction schedule control.

The sludge and pondcrete processing costs have been estimated at only a conceptual level. It is expected that the estimated processing cost will be reduced



as treatability study results are obtained. The treatability studies are designed as much as practicable to take advantage of previous sludge stabilization efforts. The design of the pondcrete processing system has been subjected to a value engineering analysis during the equipment selection evaluation.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** 3. The stated volumes of processed sludge (5,000 cubic yards [yd<sup>3</sup>]) and pondcrete (10,000 yd<sup>3</sup>) that require consolidation under the engineered cover do not appear to account for volumes that will accrue during the treatment process. Sand, portland cement, and other agents will be added to the sludge and pondcrete and apparently are not considered in the volume calculations. For example, the text states that 660,000 gallons (3,268 yd<sup>3</sup>) of sludge require treatment prior to disposal. The text then assumes that a bulking agent (possibly sand) will be mixed with the sludge at a ratio of 2.5:1 by volume. This results in a 8,170 yd<sup>3</sup> volume requiring disposal beneath the cover. The text also assumes the use of 0.5 tons of cement/lime mix per wet ton of SEP 207-A and 207-B sludge, which would further increase the volume. The volume of sludge to be disposed of under the cover has apparently been understated by more than 3,000 yd<sup>3</sup>.

The text states that the total volume of pondcrete to be processed is 194,340 cubic feet (7,200 yd<sup>3</sup>). It further states that 0.74 tons of sand per ton of pondcrete will be required, raising the volume to more than 10,500 yd<sup>3</sup>. Next, it states that 0.6 tons of cement will be required per ton of concrete, further increasing the volume estimate to possibly 14,800 yd<sup>3</sup>. The volume of pondcrete to be disposed of under the cover apparently has been understated by almost 5,000 yd<sup>3</sup>. These volume variations could affect capacity constraints and should be discussed.

**Response:** Treatability studies for OU4 sludge and pondcrete were begun just prior to the issuance of the IM/IRA-EA Decision Document. The draft treatability study reports have recently been issued. The results of these draft studies have defined processing envelopes for sludge and pondcrete. It is concluded in the draft reports that the processed materials will meet the waste acceptance criteria set forth in the IM/IRA-EA Decision Document. (The total volume of all processed materials may only slightly exceed 20,000 cubic yards.)

**Action:** The text of the IM/IRA-EA Decision Document will be modified to clarify the anticipated volume of processed pondcrete.

.....  
**Comment:** 4. The text describes sand as a potential bulking agent to be used during the sludge treatment process. DOE should consider using OU4 soils as a bulking agent to minimize waste.

**Response:** As a result of the recent treatability studies, a bulking agent is no longer required in the processed sludge or pondcrete formulations. Although a bulking agent will not be used, it was previously determined that soils would not immobilize the contaminants in the sludge. Therefore, soil was not considered to be an appropriate bulking agent.

**Action:** The IM/IRA-EA Decision Document will be revised to delete the discussion concerning the bulking agent.

.....  
**Comment:** 5. The IM/IRA document does not show that the subsurface drain will function as intended. Flow calculations based on hydraulic conductivity, slope of the drain, and drain thickness are not provided. As a result, EPA staff met with Engineering Science's (EG&G's subcontractor) technical personnel to discuss the subsurface drainage design. During the discussions Engineering Sciences technical personnel presented specific calculations regarding drain flowrates and expected rate of recharge into the drain using subsurface drainage design specifications. These specific calculations showed that the subsurface drain will be capable of removing water at a higher rate than the rate at which it recharges into the drain from below. Since this information is critical information, EPA requests that a summary of these calculations be included in the IM/IRA document.

**Response:** The subsurface drainage calculations will be submitted with the 90% Design Document.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** 6. EPA feels that the proposed extensive monitoring plan within the engineering cover needs to be further justified. The document does not discuss potential corrective actions that would be implemented if monitoring systems indicate a failure of the containment system. The applicability and justification of proposed monitoring systems are related to how the data will be employed

when developing and implementing corrective action. For example, if corrective actions that address detected leaks in the cover system or groundwater rising into the waste are not feasible, then the need for a monitoring system that detects these conditions may not be warranted either. The adequacy of a monitoring system or the usability of its data cannot be easily evaluated without detail about the types of corrective actions that might be implemented. Therefore, the conceptual monitoring system plan should be discussed in conjunction with corrective actions that will be triggered based on system data.

**Response:** Based on direction from CDPHE, Part V of the IM/IRA-EA Decision Document is considered to be sufficient to fulfill the requirements of an interim status post-closure plan. The information contained in Part V will be supplemented with a post-closure permit application after completion of closure. The post-closure permit application will provide further details regarding corrective actions that will be taken in response to monitoring results. It should be noted that some of the monitoring instruments are installed to determine the overall performance of the engineered cover, not to invoke corrective actions. This type of monitoring is intended to provide an early warning of problems that could result in exceedences at the point of compliance. The type of corrective action required will depend on the results of the "early warning" systems and point of compliance monitoring wells.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** 7. The document provided little detail regarding the air monitoring configuration or the air monitoring equipment proposed for remedial actions. In addition, the objectives of the air monitoring plan were not clearly stated. Therefore, it was difficult to evaluate whether the proposed air monitoring plan will provide protection for human health and the environment. Although detailed equipment specifications are not necessary for the IM/IRA, DOE should demonstrate that the potential air monitoring equipment and configuration will meet the air monitoring plan objectives and provide protection for human health and the environment during the implementation of the remedial action.

**Response:** The IM/IRA-EA Decision Document will be revised to clarify the purpose and location of the air monitoring system. Currently, RFETS performs air monitoring

for both radiological and non-radiological emissions at various locations around the site. The location of the non-radiological air monitor is near the east gate of the RFETS site, in the most likely wind direction. The radiological air monitors are located at various points on the RFETS boundary, and there are also monitors maintained outside the site boundary. All of the monitoring is done on a continuous basis. The text will be modified to reflect that the established site program of perimeter air monitoring will be used to assess any impact to air quality that the SEP construction/remediation will cause.

**Action:** The first sentence of the "Air Monitoring" discussion (see page IV-121 of the IM/IRA-EA Decision Document) will be replaced with "The objective for the air monitoring program is to ensure that no worker or member of the general public is exposed to airborne contamination in excess of the 10 mrem per year standard specified in 10 CFR 835 and 40 CFR 61, Subpart H."

The sentence "Real-time monitoring will be performed by health and safety specialists to ensure that the construction environment is suitable for worker safety" will be followed by, "The location of the air monitoring will be determined at the time of the monitoring based on the wind conditions at that time. The monitors should be placed downwind of the construction area with at least one sample taken upwind to determine the component of the emissions that are due to the construction activities."

The sentence "Air samples will be routinely taken at the RFETS boundary in order to assess impacts to the general public." will be changed to "Air samples are continuously taken at the RFETS boundary and at community monitoring stations by RFETS personnel in order to assess air emissions impacts to the general public." Also added to the last sentence will be, "... to exceed the 10 mrem effective dose equivalent limit (*excluding radon and its progeny*)."

.....  
**II.2.3 SPECIFIC COMMENTS**

**Comment:** 1. Page III-47, Section III.3.2.2. This section discusses the temporary cover option. The text states that this option could be implemented if more time is required to obtain additional hydrogeological data to assess the need for groundwater remediation. It is not clear how the need for groundwater remediation will affect the proposed remediation strategy, especially considering that the strategy is based on the assumption that the SEPs have been a source of groundwater contamination.

It appears to be more likely that the temporary cover would be used if OU4 remediation activities could be integrated with other RFETS OU remedial actions. The temporary cover could be an interim measure at OU4 until OU4 activities can be coordinated with other OU remedial actions.

**Response:** DOE agrees.

**Action:** The referenced sentence will be modified to read, "The temporary cover option would be implemented as an interim measure in the event that a significant amount of time is required to coordinate the final OU4 SEP closure into an integrated sitewide closure strategy."

.....  
**Comment:** 2. Page III-70, Third Full Paragraph. This paragraph discusses potential remediation strategies for the SEP sludge and clarifier sludge. It is not clear why sludge consolidation under the cap without solidification is not considered as an option. The options imply that solidification is necessary prior to disposal under the cap. Previously, only sludge dewatering was necessary prior to disposal. No rationale was provided for including the solidification requirement.

**Response:** The sludge has been shown through bench-scale filtration tests to be difficult to dewater. Successful dewatering was accomplished only after adding inorganic materials such as cement and flyash to the sludge to prevent the filter media from rapidly blinding. Typical filter aids did not provide any significant advantages. The amounts of required additives produced significant volume increases in the filter cake similar to cement solidification. Comparative costs of dewatering have been provided to the EPA showing that the dewatering alternative costs exceed the cost of solidification. The cost of dewatering was estimated to be approximately \$25 million and did not include filtrate processing and disposal costs. The cost of solidifying sludge was estimated to be approximately \$19 million. Therefore the solidification alternative is anticipated to provide a cost savings of around \$6 million.

**Action:** The IM/IRA-EA Decision Document will be revised to indicate that solidification was chosen as the representative process option for treating/dewatering the sludge on the basis of cost.

.....  
**Comment:** 3. Page III-77, Second Full Paragraph and Page III-86, Last Paragraph. These paragraphs discuss the disadvantages of the RCRA-compliant cover and the

engineered cover. The paragraphs state that, if it is determined that contaminants left in-place pose a significant risk via the groundwater pathway, the entire source control remedy may have to be replaced. These statements require further explanation because the RCRA-compliant cover and the engineered cover (and monitoring systems) function to protect groundwater. It is not clear why the text indicates that they would only be effective if the contaminants are not a threat to groundwater.

**Response:** The paragraphs in question read, "*The drawback of this GRA is that the contaminants would remain after closure. If it is determined in the future that the contaminants left in place pose a significant risk via the ground water pathway, the entire source-control remedy may have to be replaced. This would result in a significant expenditure of additional funds.*" (italics added). These statements appear in the summary paragraphs of GRAs IIA, IIC, IIIA, and IIIB and pertain to the GRAs, not just to the engineered cover. The point of these statements is that if one of these GRAs that retains contaminants in place is selected, then the potential will exist for contaminants to migrate into the groundwater. If in the future (after closure) this condition is determined to have a negative impact on human health or the environment, then a significant effort will be required to implement an additional remedy.

**Action:** The IM/IRA-EA Decision Document will be revised as noted above.

.....  
**Comment:** 4. Page III-79, Second Paragraph. This paragraph discusses advantages to the temporary cover. One main advantage has been omitted. Scheduling flexibility should be considered a significant advantage for the temporary cover. The temporary cover could provide flexibility that allows for integration with other OUs and, as a result, large savings of resources.

**Response:** It is agreed that the temporary cover GRA allows for flexibility in scheduling and coordination of other RFETS remedial actions.

**Action:** The third paragraph, first bulleted item (under Advantages) of page III-79 will be revised so that the sentence reads, "Additional remedial actions at OU4, if necessary, could be easily implemented and/or coordinated with other RFETS remedial actions; and..."

.....  
**Comment:** 5. Page IV-65, Last Paragraph. The text states that a trench will be excavated within the compacted SEP 207-C soils for the disposition of debris that

cannot be decontaminated. It then states that the trench will be filled with grout so that void spaces caused by the size-reduced debris are plugged and differential settlement is minimized. Although this may minimize differential settlement within the trench, the grout-filled trench will act as a 400-yd<sup>3</sup> monolith beneath the cover. This monolith will not settle as quickly as the surrounding compacted soils and could cause differential settlement. Instead, the debris could potentially be placed with the lifts of contaminated soils and be compacted with the soils to reduce the potential for differential settlement.

**Response:** The consolidated contaminated soils will be compacted to 95% modified proctor density. Settlement is expected to be minimal and should not cause differential settlement between the soils and monolith. The differential settlement associated with placing a debris/soil mixture in lifts followed by compaction is expected to be greater than the monolith option since compaction around bulk debris would not be as effective.

**Action:** Text will be revised as described in the comment response.

**Comment:** 6. Page IV-84, Fifth Paragraph. This paragraph states that routine testing of the staged processed sludge will be performed as previously discussed. However, the previous discussion was not referenced. It appears that the document does not specify testing required to determine whether sludge meets the WAC. Also, the document does not identify pathogens in OU4 sludge that require destruction. The means for determining whether pathogens have been destroyed should also be explained.

**Response:** Two of the OU4 Waste Acceptance Criteria state that 1. Pathogens, if present, shall be rendered innocuous, and 2. Any gas production from the treated waste shall be not greater than that generated by natural site soil. Since the ponds were previously used to hold minor amounts of septic waste, these criteria have been specified to prevent differential pressure from occurring on the engineered cover's asphalt membrane from possible microbiological activity (gas generation) in the wastes. EPA's "Guide to Septage Treatment and Disposal," 1994, indicates that using lime and holding a waste's pH at or above 12 for 30 minutes meets the Federal requirements for stabilization of septage. If waste pathogens are indeed destroyed under these conditions, as would occur during OU4 waste processing, then the species of pathogens are irrelevant for OU4 since the waste would meet the Waste Acceptance Criteria.

The Accelerated Pond Sludge Processing Draft Conceptual Design Report was issued on April 10, 1995 for 90% Review and has been under development since the issuance of the proposed IM/IRA-EA Decision Document. This report currently states that each container of processed waste will be field-tested for compliance with the Waste Acceptance Criteria. Field-testing will consist of obtaining a composite grab-sample from each waste container and verifying that the waste pH is at least 12.0. The composite grab-sample will be taken from various locations and depths within each waste container.

**Action:** The first sentence of the fifth paragraph of page IV-84 will be revised so that the words "as previously described." will be replaced with "by obtaining a composite grab-sample from each TSTU and verifying that the processed waste has a minimum pH of 12.0 and passes the Paint-Filter Test."

.....  
**Comment:** 7. Page IV-85, Section IV.3.5.5. This section discusses the methods proposed to transfer processed sludge to the OU4 area. It does not describe the fate of the sludge after it arrives at OU4. According to the WAC, the sludge should be disposed of shortly after its arrival at OU4.

**Response:** The sixth bulleted item waste acceptance criterion for particulate-form wastes (page IV-17) states that wastes will be delivered to OU4 "just-in-time" to minimize construction inefficiency, storage, and material handling. If this criterion is met, then the waste will immediately be consolidated with the other wastes and contaminated media. If the waste is allowed a variance to "just-in-time" delivery, then as stated in the criterion, the material will be stocked in small piles that are demonstrated to not produce excessive dust or fines when stored, degrade when wet, or produce dispersable fines when moved from the stockpile using existing site remediation equipment.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

.....  
**Comment:** 8. Page IV-85, Section IV.3.5.5. This section discusses the methods proposed to transfer processed sludge to the OU4 area. The methods proposed for mixing processed sludge with soils and liners once the sludge arrives at OU4 are not described in the document.

**Response:** The methods for mixing the OU4 contaminated materials are addressed in Section IV.6.5 of the IM/IRA-EA Decision Document. This section states that the contaminated materials will be blended to provide a mixture with homogeneous



physical characteristics. The contaminated materials will be mixed on the basis of their relative individual volumes with respect to the total volume of contaminated materials to be consolidated under the engineered cover. Based on current estimates, the volumes of materials to be consolidated under the engineered cover are as follows (see page IV-116 of the IM/IRA-EA Decision Document):

• SEP A and B Soils	92,200 yd <sup>3</sup>	(77.5%)
• Processed Pondcrete	10,000 yd <sup>3</sup>	(8.4%)
• Processed Sludge	5,000 yd <sup>3</sup>	(4.2%)
• Crushed Liners	11,800 yd <sup>3</sup>	(9.9%)

The percentages in parentheses provide the relative volume ratios for the blended consolidated materials to achieve a homogeneous mixture. The ratios provided above are targets and will vary on the relative total volume of OU4 materials to be consolidated. The overall objective of the blending is to attain a mixture that is as homogeneous as possible with respect to the physical characteristics for compaction and settlement.

The equipment and operating procedures used to blend the contaminated materials were not specified in the IM/IRA-EA Decision Document to allow the construction subcontractor to choose blending methods and equipment. The construction subcontractor will be responsible to meet project design criteria and OU4 waste acceptance criteria through compliance with performance specifications.

**Action:** The following sentence will be added to the last paragraph, after the second sentence of page IV-65: "Homogeneity of the blended consolidated materials will be achieved by mixing the materials in volume ratios averaged over the total estimated volume for the materials to be consolidated under the engineered cover."

The following section will be added to the Design Basis Assumptions:

"IV.2.6.x The consolidated contaminated materials to be consolidated under the final engineered cover will be blended to achieve a mixture with homogeneous physical characteristics. The contaminated materials will be mixed on the basis of their relative individual volumes with respect to the total volume of contaminated materials to be consolidated under the engineered cover. Based on

current estimates, the volume of materials to be consolidated under the engineered cover are as follows:

• SEP A and B Soils	92,200 yd <sup>3</sup>	(77.5%)
• Processed Pondcrete	10,000 yd <sup>3</sup>	(8.4%)
• Processed Sludge	5,000 yd <sup>3</sup>	(4.2%)
• Crushed Liners	11,800 yd <sup>3</sup>	(9.9%)

The percentages in the parentheses provide the relative volume ratios for the blended consolidated materials to achieve a homogeneous mixture. The ratios provided above are targets and will vary on the relative total volume of OU4 materials to be consolidated."

**Comment:** 9. Page IV-96, First Paragraph. The text states that equipment associated with Building 788 that cannot be decontaminated may be crushed, flattened, or shredded and spread into a thin layer above the consolidated liners, provided that the material will not cause differential settlement of the final engineered cover. This strategy appears to contradict the aforementioned trench/grout strategy. However, the strategy of spreading a layer of crushed, flattened, or shredded equipment above the consolidated liners may minimize differential settlement relative to the trench (see Comment 1 above).

**Response:** This first paragraph of page IV-96 is not inconsistent with the disposition of materials in the grout entombment because both methods of consolidation will be used. In general, debris that cannot be decontaminated and that would be susceptible to crushing, shredding, or flattening (e.g. concrete, metal siding, and piping) will be processed in this manner and dispositioned as described in this paragraph. Debris that cannot be decontaminated and that would not be easily size-reduced or flattened (e.g. pumps, motors, and valves) will be entombed.

**Action:** The eighth sentence of the last paragraph of page IV-65 will be revised so that the words "and cannot be effectively size-reduced or flattened" will be added at the end.

The following will be added to the end of the first paragraph of page IV-96:  
"Debris that cannot be decontaminated and that potentially may be crushed, flattened, or shredded include, but are not limited to concrete foundations; piping; clarifier walls, bottom, and ladder; and building structural members, siding, and roofing. Large debris that cannot be decontaminated and that cannot be effectively size-reduced or flattened will be dispositioned in the grout entombment

and include, but are not limited to process pumps, valves, mixers, motors, and other equipment."

.....  
**Comment:** 10. Page IV-110, Section IV.6. This section discusses the implementation plan and schedule and discusses potential failure scenarios that have been evaluated. The document does not provide a contingency plan for the failure scenarios. Presumably, the temporary cover option would be pursued.

**Response:** The IM/IRA-EA Decision Document does not include a contingency plan for a failure of the system. However, the document will be modified to note that DOE is responsible for monitoring the system and for performing adequate repairs in the event that there is a failure which has a negative impact on the system's ability to be protective of human health and the environment. It should be noted that repairs will be made on a case-by-case basis dependent upon the type of failure and the impact that the failure will have on human health and the environment. A contingency plan will be included in the post-closure care permit application. The IM/IRA-EA Decision Document will be revised to state that DOE is responsible for providing maintenance to ensure protection of human health and the environment.

The document will be modified to include a list of the various failure scenarios that will be considered during the design and what was provided to negate or minimize the failure.

**Action:** The IM/IRA-EA Decision Document will be modified as noted above.

.....  
**Comment:** 11. Appendix IV.B, Drawing 51045-122. This drawing shows several cross sections which depict the subsurface drain and the associated subsurface trench drain. The extent of the trench drain is not clear. The trench drain is shown on the south end of cross section D-D', which is not consistent with the location of the trench drain shown on Drawing 51045-130. The location of this trench drain could influence the effectiveness of the subsurface drain and should be clearly specified.

**Response:** Drawing 122 Section D-D will be updated to delete the upstream trench drain. The extent of this trench drain is correctly shown on Drawing 115.

**Action:** The drawing will be revised as described in the comment response.  
.....

**Comment:** 12. Appendix IV.B, Drawing 51045-122. This drawing shows cross section E-E' and references Detail 1 for information regarding the trench drain. This reference should be relabeled as detail 2.

**Response:** DOE agrees.

**Action:** The reference will be relabeled as detail 2.

.....  
**Comment:** 13. Appendix IV.B, Drawing 51045-123. This drawing shows a detail depicting a typical engineered cover section and shows a geotextile located between the asphalt membrane and the asphalt concrete. The purpose of this geotextile is unclear. Efforts have been made to include only natural, durable materials in the cover. This geotextile is not a natural material and should be discussed.

**Response:** The inclusion of the geotextile material will be discussed in the Design Basis report. The geotextile material is included to aid in the construction process to allow off-gassing of the asphalt concrete. This reduces the required cure time of the concrete, thus allowing the asphalt membrane to be placed sooner.

**Action:** The following text will be added to the IM/IRA-EA DD: "The geotextile material is included in the cover design to aid in the construction process. The material will allow the off-gassing of the asphalt concrete. This process reduces the required cure time for the concrete, thus allowing the asphalt membrane to be placed sooner."

.....  
**Comment:** 14. Appendix IV.H, Geotechnical Analysis. This appendix presents the results of the slope stability modeling that was conducted for the hillside north of the SEPs. The proposed location for the consolidated waste and engineered cover is a significant concern due to potential slope instabilities on the northern hillside. In 1970, the landslide potential of the northern hillside was investigated. The investigation included drilling 10 test holes to evaluate hillside stability (Woodward-Clyde 1970). The report concluded that the hillside was at high risk of failure, particularly with the probable addition of water from the solar evaporation ponds (SEPs). A french drain system was recommended to remove groundwater from the area in order to stabilize the hillside. In 1979, an additional study by CTL/Thompson (1979) investigated impacts from a perimeter security zone (PSZ) alignment change on the hillside north of the SEPs (DOE 1994). The field investigation found that both the clay and claystone bedrock underlying the alluvium contained

shear zones indicating prior disturbance and confirming previous conclusions regarding landslide potential (DOE 1994). The report concluded that (1) most of the bedrock within the depth investigated is disturbed from past ground movements, (2) the hillside is underlain by both ancient and recent landslides, and (3) the PSZ earthwork could trigger slope instability and impact the SEPs by loading the weak, disturbed natural materials (DOE 1994). The report confirmed the 1970 report of landslide potential and made recommendations based on the assumption that landslides were imminent unless some measures were taken to alter the conditions (DOE 1994).

Slope stability modeling was conducted for the northern hillside in Fall 1994 to address previous slope instability concerns. Appendix IV.H of the IM/IRA presents the results. Samples were collected from four boreholes to obtain physical properties of the soil and bedrock in the vicinity of the SEPs. Three boreholes (GB-2, GB-3, and GB-4) were drilled on the hillside directly below the ponds in areas where past slumping was suspected. However, the samples were found to be relatively undisturbed (DOE 1995). Samples were collected from colluvium, shallow bedrock, and deep bedrock at GB-2, GB-3, and GB-4. The fourth boring (GB-1) provided samples of fractured, colluvial claystone from a known slump block in the buffer zone. This sample of fractured colluvial claystone was deemed to be appropriate for testing residual strengths of weak zones in claystone (DOE 1995). The collected samples were tested for shear strength and other properties relevant to the slope stability analysis (DOE 1995).

According to the IM/IRA, conservative scenarios were then modeled using XSTABL to predict slope stability. XSTABL calculated adequate factors of safety against slope failure for three of the four scenarios modeled. For the scenario with an inadequate factor of safety, known slump block strength values were assumed for both shallow and deep claystone under dynamic loading. However, this scenario was believed to be unrealistic because previous samples of deep claystone appeared to be intact with few fractures and are more representative of actual conditions. Therefore, the IM/IRA concludes that, based on the data from the geotechnical investigation and XSTABL modeling, the slope on the northern hillside is stable.

Conclusions based on the model are highly questionable. The model shows that the northern hillside is stable, however, the existing slump blocks on the hillside certainly indicate otherwise. Since slumping has occurred in the past, it is reasonable to assume that the hillside is unstable and that future

slumping is possible. There appears to be little doubt that slump blocks exist between the SEPs and North Walnut Creek. The previous studies mentioned above have provided physical evidence that slumping on the hillside has occurred. In addition, Figure II.3.5-2 in Part II of the IM/IRA depicts possible slump blocks on the hillside. The text on Page II.3-92 also identifies a slump block along the crest of a hill, located directly downslope from SEP 207-A and SEP 207-B. This slump block has been identified by lithological descriptions from borehole logs 46193 and 46293, which have similar descriptions compared to other known slump block boreholes. Therefore, modeled scenarios are not likely realistic, accurate, or conservative. The model (using a cross section from the SEPs to North Walnut Creek) has not predicted slope failure; however, slope failure has occurred on this hillside. In addition, representative samples may not have been taken. The sampling locations during the recent study do not coincide with slump blocks identified in the IM/IRA (with the exception of GB-1). In addition, even if slump blocks are not identified through sampling the upper portion of the hillside, it is reasonable to assume that slumping in lower portions of the hillside (closer to North Walnut Creek) could indirectly cause upslope instabilities that could affect capping system integrity.

Physical evidence does not support the assumptions and conclusions in Appendix IV.H of the IM/IRA. Based on the information presented, it appears that it would be difficult to insure that the northern hillside will be stable for 1,000 years.

**Response:** As discussed in Comment No. 14, two geotechnical investigations of the hillside north of the SEPs have been performed. The first, by Woodward-Clyde (1970), concluded that the hillside "is a high risk area for landsliding." The report states that the two recommended means for stabilizing the hillside include regrading and controlling drainage. As described below, the proposed cover design utilizes both of these methods and to a greater degree than recommended by Woodward-Clyde.

The specific recommendation for grading focuses on the "large volume of fill north of pond 207-C." The Woodward-Clyde recommendation is to regrade this fill to a slope of 1.5:1 to remove the load from the top of the hillside. For the proposed engineered cover design, the berms at the crest of the hillside will be excavated and there will be no slopes on the upper portion of the north hillside that exceed 5:1.

The recommendation for controlling drainage includes installation of berms to control surface water flow away from the hillside and subsurface trench drains at the toe of the upper hillside slope. For the proposed engineered cover, surface water will be controlled by means of berms and sand-filled ditches to ensure that water coming onsite from upgradient sources and precipitation landing on the cover will not flow down the north hillside. The subsurface drainage will be controlled by the ITS system at the toe of the slope, as recommended by Woodward-Clyde, and also by means of the proposed subsurface drain and perimeter/exit trenches, which will function to keep groundwater levels under control at the crest of the slope (i.e., under the engineered cover) and, to a lesser degree, on the north hillside.

Considering the geotechnical testing activities performed for the Woodward-Clyde study, it is difficult to understand why the conclusion was made that the hillside is a high risk area for landsliding. The only testing that was performed for determining shear strengths of the native materials used unconfined compression procedures. This test method was performed on intact specimens of claystone and resulted in data, which if used in slope stability analyses, would have resulted in extremely liberal factors of safety (i.e., the hillside would have appeared to have an excessively high factor of safety). It is likely that the conclusions were based primarily on field observations. Regardless of how the conclusions of this report were obtained, DOE considers that the proposed IM/IRA design is consistent with the Woodward-Clyde recommendations for slope stabilization.

The second geotechnical investigation performed in the vicinity of OU4 (CTL Thompson, 1979) concludes that the "hillside is underlain by both ancient and recent landslides." The figures in the report show that the borings for the investigation were drilled on the lower portion of the north hillside, north of the patrol road. This is the same area in which DOE confirmed the existence of a slump block (Boring GB-1) during the geotechnical investigation (Fall, 1994). In general, the lower hillside is steeper than the upper hillside (south of the patrol road) and hence is more prone to landsliding. The CTL Thompson investigation did not perform any borings on the upper hillside, which was the focus of the Fall 1994 study.

The conclusions made in the CTL Thompson report included recommendations to flatten the critical slopes to a 5:1 grade. The report also states that "the planned cut slopes on the uphill side of the patrol road will be stable," though "sloughing and small slipouts are a possibility." As mentioned previously, the IM/IRA design incorporates grading of the upper hillside so that 5:1 is the

steepest grade. This grading will further stabilize the slope in comparison to the conditions encountered by CTL Thompson. DOE feels that implementation of the proposed grading plan will adequately stabilize the upper hillside.

In summary, the CTL Thompson investigation was performed primarily to evaluate the stability of the lower hillside. CTL Thompson concluded that the upper hillside is stable, which is consistent with the results of the recent modeling. The stability of the lower hillside and the potential impacts on the upper hillside and the engineered cover are discussed later in this comment response.

For the geotechnical investigation performed during the Fall 1994, an attempt was made to collect and test samples of soil and bedrock materials from landslide failure areas. For the borings drilled in the upper hillside (i.e., GB-2, GB-3, and GB-4), no direct distinct evidence of slumping was found though the weathered bedrock was highly fractured. Boreholes were placed as close as possible to potential slump blocks that were inferred from the interpretation of seismic refraction data. DOE interprets that the fracturing of the bedrock underlying the upper portion of the north hillside is primarily caused by weathering processes during deposition of the Arapahoe and/or Rocky Flats Alluvium formation. The suspected slump blocks adjacent to the Ponds were identified considering topography of the bedrock surface as interpreted from boreholes and seismic refraction information. Based upon the results of the geotechnical investigation and further review of the available data, DOE considers that the fracturing of the bedrock in the area adjacent to the Ponds is not related to landsliding and that the enclosed highs adjacent to the Ponds are bedrock erosional remnants. With borehole GB-1, an actual slip plane was cut. The fracture was filled with sand, had post-depositional laminae in the fractures, and manganese and iron staining suggesting groundwater flow through the fracture. Fractures adjacent to the Ponds are within the bedrock and are not suggestive of any movement. A more complete understanding of the slumping that has occurred in OU4 will be obtained upon the interpretation of the Phase II RFI/RI seismic refraction program.

The modeling of the north hillside focused on the critical section (i.e., the steepest) that cuts through the engineered cover and the upper hillside. Using strength parameters determined by testing samples from a confirmed failure zone (on the lower hillside), the upper hillside appears to be stable. No modeling was performed for the lower hillside because it was felt that sloughing of this lower slope would not impact the upper slope due to the significant distance of level



ground (the security area and the patrol road) between the two slope areas. However, in order to ease the concerns expressed in Comment No. 14, DOE will perform further modeling "failure" (i.e., factor of Safety less than or equal to 1) for the lower slope at a section through the known failure zone. An attempt will then be made to evaluate the potential for a progressive slope failure initiating at the lower slope to impact the upper slope and the engineered cover.

Regarding the comment that representative samples may not have been taken, DOE considers that the slope stability modeling took this possibility into account by using the most conservative strength parameters found during the investigation. A suspected slump block was confirmed and the residual shear strength of the fractured claystone was estimated by collecting and testing samples from the confirmed failure zone. Though no slump blocks were identified on the upper hillside, the strength parameters determined for samples from the lower hillside slump block were used for all analyses of the upper hillside. DOE considers this to be a conservative analysis of the hillside stability.

**Action:** Additional XSTABL modeling will be performed as mentioned above.

**Comment:** 15. Page V-1, Section V.1.1, First Paragraph. The sentence states that the plan is intended to also serve as the final post-closure care and monitoring plan for the solar ponds after closure. This plan should only be intended to serve as the final conceptual post-closure care and monitoring plan for the SEPs. The final detailed monitoring plan will be submitted as a part of the post-closure plan.

**Response:** Per direction from CDPHE, Part V of the IM/IRA-EA Decision Document will fulfill the requirements for the interim status post-closure required to be submitted in accordance with 6 CCR 1007-3, 265.118. Additional post-closure monitoring details will be provided in the post-closure permit application which is to be submitted to CDPHE/EPA for review and approval. The permit application will be submitted after final closure of the solar evaporation ponds.

**Action:** The text of the first paragraph will be revised as follows: "Part V of the IM/IRA-EA Decision Document is intended to be the interim status post-closure care and monitoring plan (i.e., 6 CCR 1007-3, 265.118) which will be implemented closure occurs. These provisions will be supplemented with the submission of a post-closure permit application which will be submitted to CDPHE following the completion of closure. The post-closure permit application will be prepared to fulfill the monitoring and maintenance requirements specified in 6 CCR 1007-3,

264, Subpart F. Review and approval of the post-closure permit application will occur some time in the future. Therefore, Part V was prepared so that agency ...."

.....  
**Comment:** 16. Pages V-43 through V-45, Section V.4.2.2 and V.4.2.3. These sections describe the locations of the neutron probe access tubes and the pressure-vacuum lysimeters in the vadose zone. The deepest extent of both are listed as 2 feet above the top of the subsurface drainage layer within the consolidated waste pile. An explanation of why the probes are to be placed 2 feet above the drainage layer instead of at the top of the drainage layer (at the base of the waste pile) should be provided. It is understood that the probes are to aid in detecting wetting fronts moving through the waste, but they presumably also aid in early detection of a rising water table. A lower placement of the probes would be more likely to aid in the early detection of a rising water table.

**Response:** It is correct that the neutron probes aid in the detection of wetting fronts moving both upward and downward. The radius of influence of the neutron probes is approximately 2 feet, meaning that the instruments will detect moisture content within a 2-foot radius from the centerline of the neutron probe access tube. Since the occurrence of water within the subsurface drain is not of concern (only water movement upward through the subsurface drain and into the waste pile is of concern), the neutron probe access tubes were moved upward so that the radius of influence of the neutron probes does not intersect the subsurface drain. This approach avoids undesirable "false positives" associated with water simply moving through the subsurface drain. Thus, the neutron probes will detect water moving upward from the subsurface drain into the waste pile as well as water moving downward through the waste pile from above.

**Action:** The text will be revised to more clearly describe the location of the neutron probe access tubes as 2 feet above the bottom of the waste pile, which is also 2 feet above the top of the subsurface drainage layer.

.....  
**Comment:** 17. Page IV-121, Paragraph 2. The text states that "Air monitoring will be performed in several locations during construction/excavation activities in order to assess the quantities and types of dust emissions." Because the transport of fugitive dust is highly dependent on wind speed and wind direction, the text should indicate where the monitors will be located in relation to construction and excavation activities. The monitoring

configuration should surround the dust-generating activities so that excess dust emissions from all possible wind regimes will be detected.

**Response:** See response to General Comment #7.

**Action:** The IM/IRA-EA Decision Document will be revised in accordance with response and action to General Comment #7.

.....  
**Comment:** 18. Page IV-140. The emission equation for dumping given in this section is incorrect. The equation is given as follows:

$$\text{Dumping Emission Rate (kg/Mg)} = k (0.0016) \left(\frac{U}{2.2}\right)^{1.3} \left(\frac{M}{2}\right)^{1.4}$$

The equation for dumping should be as follows:

$$\text{Dumping Emission Rate (kg/Mg)} = k (0.0016) \left(\frac{U}{2.2}\right)^{1.3} \left(\frac{M}{2}\right)^{-1.4}$$

The modeled emission rates for dumping appear to be correct. The equation should be corrected and the modeled emission rates for dumping should be verified.

**Response:** DOE agrees.

**Action:** The IM/IRA-EA Decision Document will be modified to include the correct equation as:

$$\text{Dumping Emission Rate (kg/Mg)} = k * (0.0016) * \left(\frac{u}{2.2}\right)^{1.3} * \left(\frac{m}{2}\right)^{-1.4}$$

.....  
**Comment:** 19. Page IV-122, Paragraph 1. The first sentence states that air samples will be routinely taken at the RFETS boundary in order to assess impact to the general public. It appears that the air sampling that will be conducted at the RFETS boundary will not be continuous, real-time monitoring like the monitoring at the SEPs. If this is the case, justification for not requiring

continuous, real-time monitoring at the boundary as it is at the SEPs should be provided. In addition, more detail should be given regarding the air sampling that is planned at the RFETS boundary and at the SEPs.

**Response:** DOE agrees. See response to General Comment #7.

**Action:** The IM/IRA-EA Decision Document will be modified as noted in the response to General Comment #7.

.....  
**Comment:** 20. Page V-38, Paragraph 1. This section states "The final engineered cover monitoring system will consist of. . . a meteorological station installed at OU4 to record climatic factors that affect water balance in the cover/barrier." Page V-40, Paragraph 2 states, "Based on a review of the locations and functions of existing stations, a new meteorological station may be constructed, or existing facilities may be utilized." It is unclear whether a new meteorological station will be installed at OU4 or whether existing stations will be used. This should be clarified. Further, if existing meteorological equipment will be used for the data collection, the criteria for determining its adequacy should be addressed.

**Response:** The review of existing stations has been completed, and the decision has been made to install a new meteorological station at OU4. The specifications for the new meteorological station are contained within the Title II design for the pond closure.

**Action:** The text will be modified to state that a new meteorological station will be installed.

.....  
**Comment:** 21. Section V, Drawings 51045-151 and 51045-152. These drawings show the location of the proposed meteorological station. It appears that the station will be located next to the engineered cap and about 40 feet below the apex of the cap. This location could result in erroneous meteorological data resulting from the effects of the cap on wind flow. The location of the meteorological station should be chosen with careful consideration of the surrounding topography.

**Response:** The location of the meteorological station in the IM/IRA-EA Decision Document was conceptual and does not necessarily reflect the final design location. In the Title II design, the location of the meteorological station was selected carefully based on a review of the closure design. This review was performed by a

qualified meteorologist, and the location was selected in conjunction with the specified meteorological station tower height to avoid interference from the cover or surrounding topography.

**Action:** The response to this comment does not necessitate a change in the IM/IRA-EA Decision Document.

**Commentor:** Kathy Loveall

**Comment:** Not only is dirty closure is bad for the water and the soil - but for the wildlife as well. Lots of different species depend on clean soil & water - what about them?

.....  
**Commentor:** Aaron Friedman

**Comment:** It's worth spending money to keep the earth clean.

.....  
**Commentor:** Wes Heilman

**Comment:** In the future as Denver's outlying community spreads, it will be well worth the effort to have cleaned up the hazardous waste at Rocky Flats completely. Let's not settle for a half-done job! Part of the health of the future citizens relies on effort made now!

.....  
**Commentor:** Cherry Andrews

**Comment:** My greatest concern is the potential water and air born plutonium and other radioactive waste. The potential health risk of concern other related illnesses is to great for those down wind and water to take the matter of cleanup lightly or by cutting funds.

.....  
**Commentor:** Mark Scurenk

**Comment:** I am not in favor of the proposed solution for cleanup of waste processes from industrial processes at Rocky Flats. I'm against it because of the lack of guarantee that the health and safety to the ground surrounding the landfill or human lives that may come into contact with this waste in one way or the other in the future-ever if it may be hundreds of years from now. This is not a situation to be short-sited on!

.....  
**Commentor:** Sonja Homsted

**Comment:** I strongly disagree with the short-term solution for dealing with the hazardous waste in the Solar Ponds. Please take steps to ensure the safety of myself and my children by storing this waste permanently and safely.

.....  
**Commentor:** Bunny Bouck

**Comment:** Having lived in Golden most of my life, I've worked for years to rid my environment of Rocky Flats with its health hazards. Now I would like to see this work completed in the only way that would bring it back to the state it was in before paranoid ?rulitarianism? ruined it. Please, lets CLEAN IT UP RIGHT.

.....  
**Commentor:** Mike Vuksov

**Comment:** Would you please be more careful about our environment. Children need clean water.

.....  
**Commentor:** John Bass

**Comment:** Please do everything you can to ensure a safe and complete cleanup of Rocky Flats.

.....  
**Commentor:** Betty Esnow

**Comment:** The clean-up of the Solar Ponds should be done in a way that will prevent future risk from the contaminated materials and the proposed solution does not provide for this.

.....  
**Commentor:** Claude Baud

**Comment:** It scares me that this is being treated in such an unprofessional manner.

.....  
**Commentor:** Mickey Bannister

**Comment:** The way we got into this problem in the 1st place was that effective monitoring systems were not in place. For a 1,000-year project, definite monitoring procedures must be in place.

.....  
**Commentor:** David Lindsey

**Comment:** This pond is a hazard to us now and to future generations. It must be conscientiously monitored until it no longer poses a threat to humans and animals and environment alike.

.....  
**Commentor:** Xavier Gidrol

**Comment:** No dirty closure. We must be able to monitor the situation.

.....  
**Commentor:** Annita Mitchell

**Comment:** Please waitt with any permanent storage of contaminated waste until further research has been done on long-term safety.

.....  
**Commentor:** Rosa Cyrus

**Comment:** Please consider storage which can be monitored easily! Besides, concrete will crack and crumble with time. It is not safe to line the ponds with it.

.....  
**Commentor:** Janet Bychole

**Comment:** Lets consider long-range effects and long-range goals.

.....  
**Commentor:** Paul Calcagno

**Comment:** Cleanup the site. Just don't cover it up.

.....  
**Commentor:** Andrew Morse

**Comment:** You must take action to ensure my safety. Clean up the remaining 17, 000 blocks "pondcrete" as soon as possible. This hazardous waste is unacceptable. Thank you for your attention.

.....  
**Commentor:** Danielle Fuld

**Comment:** The DOE's proposed "solution" to cleaning the ponds is no solution; it is a postponement of a clean-up. In the long-run such measure will cost more in health and environmental management expense.

.....  
**Commentor:** Timothy Henahan

**Comment:** Please continue funding to cleanup the Flats!!!

.....  
**Commentor:** Cynthia Schilling

**Comment:** Don't do what you are planning. I vote, I live here, and I used to work for the audit arm of Congress. So I know what you do and why you do it. Learn to live



for the children who will have to deal with the inept congressman/senators. Care for once!!!

.....  
**Commentor:** Jean Lynn Harrison

**Comment:** Why is the D.O.E involved in cleanup? A child who leaves streaks in his underwear will find that his mother will insist on checking his wipe job. Why should anyone trust the D.O.E. to do a good job? Maybe if you do just one cleanup completely, and thoroughly, the outraged public will quit checking your underwear so often. "Dirty closure" sounds like a half-assed wipe job to me. I am a Denver native and both my parents have cancer. My dad already died of it and my mother, a teacher in Westminster, has had both breasts removed!

.....  
**Commentor:** Dan Grandear

**Comment:** I stand firmly against any so called cleanup that does not remove, relocate, and contain nuclear/chemical waste in a safe and permanent manner--Dirty closure is not cleanup! Our children and their progeny will have to live here.

.....  
**Commentor:** Martina Holan

**Comment:** The public should be informed of the dirty closure of the Solar Ponds.

.....  
**Commentor:** Pete Kiels

**Comment:** Enclose radioactive waste in concrete cubicles lined with lead inside and outside to prevent migration into groundwater and airborne particles. Isolate from resources and biosystems. Too much money is wasted on making more solutions. The genie is out of the bottle and its intentions are life-threatening. How to put it back is the question. No more white-wash-lies, downplaying. Only the truth (even ugly) will bring solutions -sometimes from unexpected sources.

.....  
**Commentor:** Bill Roberts

**Comment:** I find your proposed solution to be so typical of our political system, where "solutions" inevitably lead to much more serious and economically painful problems! Witness your reality and responsibility. You work for MEF the people of this area! Do your job correctly or step aside and let someone who can do the job in!

**Commentor:** Jesse Baletti

**Comment:** Clean-up now!!! with no residue left and monitorable.

.....  
**Commentor:** Sam Fuqua

**Comment:** Please don't compromise the clean-up effort.

.....  
**Commentor:** Nancy Williams

**Comment:** DOE should be responsible for a state-of-the-art cleanup of the Solar Ponds at Rocky Flats. The public should be involved with the present situation as well as any future waste management.

.....  
**Commentor:** Leslee T. Alexander

**Comment:** You can't recommend closure before being aware of all of the facts and implications of such an act.

.....  
**Commentor:** T.E. DuPont

**Comment:** The document does not address who is responsible if contamination escapes from the closure into the "outside world". In 10, 20, 100 and up years if unacceptable contaminates escape who fixes and/or pays for damages? Is there a designated responsibility or will it be left up to the courts to decide? The document should address this concern.

.....  
**Commentor:** William A. Kemper

**Comment:** OU4 (question) was asked how can you put a nuclear burial site in the middle of what you expect to develop into an industrial area (?) My feeling on this issue is that what I have seen of the OU4 plan, it is a good effort well thought out. Not perfect, of course. There are all kinds of possibilities in the next 1,000 years that could make this somewhat hazardous - change of climate, water level, etc. But, realize we can not find a perfect solution. This is impossible. This is a good proposal. Lets not shoot it down. Let the well capped disposal site be a Park within the industrial area. Lets try keep solution proposed be of reasonable cost and as effective as possible. (sic)

**Commentor:** Lee Schultz

**Comment:** There was an article in the paper about capping waste and storing it at Rocky Flats instead of shipping it out of the state, which was the original plan. I attended a meeting on March 23 at the Arvada Center off of Wadsworth. I was shocked and appalled when I learned that by putting 3 articles in paper, Rocky Flats covered their legal asses as far as notifying the public about the plan to cap and leave it here at Rocky Flats. I was even more shocked and appalled that not one person I talked to had seen any of the three articles that were all against having this done in our backyards. Haven't they done enough damage to this part of the city? I hope enough is done to protect the public - that means everyone, even those of us living near Rocky Flats.

.....  
**Commentor:** George Kelly

**Comment:** Definitely should be state-of-the-art cleanup and there should be any and all available funding to learn to research how to neutralize all those things and stop using them, but we all know this, but if something wipes out a whole lot of people then I'll guess we will. It's change after the fact!

.....  
**Commentor:** Paul Klite

**Comment:** Any plans to safely contain radioactive waste onsite at Rocky Flats must include a visionary consideration of the aesthetics of the final design.

It would truly add insult to injury if the end result were to be a huge ugly tomb that might be with us for centuries.

The enclosed report depicts a number of strategies for addressing the aesthetics of large reclamation sites. I hope you find it of interest and will circulate it among the persons responsible for approving any final designs.

It is important to address this issue from the very start of any planning or design considerations.

.....  
**Commentor:** E. Vuong

**Comment:** Considering the fact that Rocky Flats is upstream from Denver and the plains further east, we cannot take any chance with underground waste storage or landfill as proposed by D.O.E. An above-ground solution must be used!

.....  
**Commentor:** Aaron Doup

**Comment:** Dumping hazardous waste into the ground no matter how much clay is irresponsible - illogical - please research saner alternatives - such as above-ground vaulting.

.....  
**Commentor:** Kathy Andeade

**Comment:** Onsite, state-of-the-art, above-ground storage only is a viable cleanup of this problem.

.....  
**Commentor:** Ted Chadick

**Comment:** Dirty closure is not cleanup. It is necessary to have above-ground, state-of-the-art, storage. An Environmental Impact Statement should be created with a good deal of public participation.

.....  
**Commentor:** Heidi J. Hook

**Comment:** Dirty closure of the Solar Ponds is not cleanup. Onsite state-of-the-art, above-ground storage of waste should be considered until a national solution to nuclear waste is found.

.....  
**Commentor:** Joe Scatmanini

**Comment:** No dirty closure, consider above-ground storage.

.....  
**Commentor:** Jill Indermill

**Comment:** Please attempt to create a state-of-the-art, onsite above-ground storage.

.....  
**Commentor:** Jay Peltz

**Comment:** Please close these ponds. All waste should be stored in above-ground monitorable retrievable sites. The public should be involved in any and all future plans. Please consider the future generations.

.....  
**Commentor:** Jessica Hodgkinson

**Comment:** Your proposed plan is NOT a good solution. Please reconsider above-ground storage that can be monitored.

.....  
**Commentor:** Jesse Holmes

**Comment:** Store ponds above-ground.

.....  
**Commentor:** Kristine Walcker

**Comment:** I urge you to insist on above-ground storage of radioactive materials. Under ground storage cannot be monitored.

.....  
**Commentor:** Catherine Moravec

**Comment:** The current proposal for the Solar Ponds is not my idea of cleanup. I believe that groundwater should be protected at all costs. Above-ground secure storage should be used.

.....  
**Commentor:** Stephanie A. Shearer

**Comment:** Dirty closure of the Solar Ponds is not a cleanup. It creates a low-level radioactive and hazardous waste dump. Onsite, state-of-the-art, above-ground storage of waste should be considered until a national solution to nuclear waste is found. An Environmental Impact Statement should be conducted, and the public should be thoroughly involved. This is important for the health of current and future generations.

.....  
**Commentor:** Jerry Solomon

**Comment:** No dirty closure! Consider above-ground storage.

.....  
**Commentor:** Jim S. Nakami

**Comment:** Once the radioactive waste has contaminated the water, that's it. It will take longer than we will ever see to have it naturally decay. The best option now seems to be to have it stored above-ground where the container can be monitored

for leakage. If they are buried, who knows what's happening to them? Out of the air would also be good so the container would not be subject to heat.

.....  
**Commentor:** YOU (my entire name)

**Comment:** My sense is you need to have safe, appropriate technology to take care of cleanup properly is this the current case? If not, above-ground storage is necessary!!!  
Thanks

.....  
**Commentor:** Helga E. Mekkel-Mattke

**Comment:** DOE is responsible for creating the best possible solution for an above-ground storage site at Rocky Flats. we must take the health of human beings now and in the future seriously!

.....  
**Commentor:** Paula Zoller

**Comment:** I oppose the "dirty closure" options with the Solar Ponds. It creates the illusion of a solution, defers ultimate responsibility to future generations at potentially higher costs both in economics and in health and safety - Above-ground MRS is the wiser option. It leaves room for future options.

.....  
**Commentor:** Donald Rickitts

**Comment:** Please, you know that the closure of Solar Ponds is not cleanup. Would you want your friends to live near a waste dump you'll sleep better taking ethical action and store the stuff above-ground until I or somebody comes up with a solution.

.....  
**Commentor:** Jeffrey Yeigian

**Comment:** I don't want to see the Rocky Flats clean-up radioactive (low-level or other) wastes dumped/landfilled into what will become a de facto "permanent" solution. Please consider interim above-ground storage while better long-term storage options are considered.

.....  
**Commentor:** Gary Mortin

**Comment:** Please do not store plutonium below the ground on an interim basis. Please put it in an above-ground storage facility so it can be monitored and it won't leak into our precious water supply.

.....  
**Commentor:** Stephanie Cohen

**Comment:** Please consider using an above-ground waste storage system instead of a dirty closure of the Solar Ponds. Thank you.

.....  
**Commentor:** David Ingalls

**Comment:** Please consider other alternatives to the dirty Pond storage of radioactive and nuclear waste. One possibility is an above-ground storage facility. An Environmental Impact Statement should definitely be filled out.

.....  
**Commentor:** Jonna Pessis

**Comment:** Do not create a disposal site - consider other alternatives such as a above-ground storage.

.....  
**Commentor:** Kathy Lebert

**Comment:** I don't want a radioactive landfill-no mater how "safe" it is viewed by its proponents. Please consider above-ground storage until a better solution can be found.

.....  
**Commentor:** Rachael Harp

**Comment:** No dirty closure of Solar Ponds - instead above-ground storage of wastes.

.....  
**Commentor:** Brian Parks

**Comment:** Please consider onsite above-ground storage until a national solution to nuclear waste is found. An EIS should be conducted and the public should be informed and involved! Consider the health of current and future generations!!

.....  
**Commentor:** Junko Watahabe

**Comment:** The Solar Ponds are not cleanup. Onsite, above-ground, monitorable, retrievable, state-of-the-art storage for wastes should be considered. An

Environmental Impact Statement should be conducted, and the public should be thoroughly involved.

.....  
**Commentor:** Scott Hatfield

**Comment:** Cheapskate dirty closure is a blatant example of the prevalent culture of contempt for the environment rampant at Rocky Flats. Condemnation of future generations for well over 10,000 years is not acceptable. Above-ground retrievable monitorable storage is necessary, preferably not in an urban site for long. Out-of-site-out-of-mind strategies are a documentation of DOE's refusal to deal with these problems responsibly. Deinstitutionalization of standard DOE philosophies with new contractors Kaiser-Hill will hasten clean-up and save money.

.....  
**Commentor:** Kyounghee Lee

**Comment:** No short-sighted and dangerous burial for the wastes! Clean-up means clean-up, not a compromise! Citizen's health and safety should be a top priority. Above-ground storage makes more sense for now until better solution comes up.

.....  
**Commentor:** Elizabeth Elting

**Comment:** It is essential that the contaminants be handled in the safest possible way and as soon as possible. Devising a method to utilize above-ground storage until better technology is available for permanent, safe storage is best.

.....  
**Commentor:** Thyria Ogletice

**Comment:** The current closing plan is not acceptable. The waste should remain above-ground so it can be monitored. More funds and research are needed to protect my young children.

.....  
**Commentor:** Melanie Skaredoff

**Comment:** A landfill is not a clean-up. Please consider a full range of alternatives including onsite, above-ground monitorable, refreinable, state-of-the-art storage for wastes.

.....  
**Commentor:** Carrol Lynn Brender



**Comment:** The planned solar pond closure creates a radioactive waste dump site that is not safely contained. The waste needs to be contained above-ground and securely until a reasonable permanent option is found.

.....  
**Commentor:** Donald Frazier

**Comment:** A landfill, as a solution to the Rocky Flats contamination dilemma is the worst step imaginable. Radioactive wastes will inevitably leak into the surrounding soil. As a citizen, and a resident of Boulder, I advocate an above-ground method instead.

.....  
**Commentor:** Susan Hutchens

**Comment:** If the ponds leaked in the first place why repeat the mistake! At least storing above-ground would allow monitoring until technology/knowledge and research money will come up with a solution. Stop messing around with yet another unsafe temporary cover-up.

.....  
**Commentor:** Christie Danner

**Comment:** Creating a low-level radioactive waste dump (i.e., Dirty Closure) of the Solar Ponds is NOT cleanup. Onsite above-ground storage of waste should be considered until a rational solution to nuclear waste is found. An EIS should be conducted and the public should be thoroughly involved.

.....  
**Commentor:** Cindy Worster

**Comment:** The proposed solution to put gravel drains and an engineered cover in the pond represents a landfill, not a cleanup. The water table is 2' -25' below the surface of these ponds, and would become contaminated with the proposed solution. I recommend a citizens task force to advise the DOE on a better solution, since it is our health that is at stake.

.....  
**Commentor:** D.J. Zupancic

**Comment:** The proposed solution is unsafe and becomes more unsafe every day of its shabby existence. Please consider an above-ground onsite, monitorable, retrievable, state-of-the-art storage until a rational solution is achieved.

.....  
**Commentor:** Judith Mohling

**Comment:** Dirty closure is a dirty deal. It restores no balance to our delicate planet. It precludes retrieval and future use of the land. It should never be called cleanup. It is the result of economic considerations, lack of reverence for the earth, and short-term thinking. The only logical storage plan for all nuclear waste is onsite, above-ground, in monitorable, retrievable, state-of-the-art containments. Only then can humans pass on from generation to generation the commitment to care for these unholy poisons until that time maybe thousands of years from now when they can be rendered harmless to the planet by some now undreamed of science.

The Solar Ponds are only an aspect of the entire Rocky Flats legacy. We need to wait until we have a full plan for ALL of the waste at Rocky Flats that is comprehensive and chosen by the public. Then, let's really begin to clean it up.

.....  
**Commentor:** Pat Cavanaugh

**Comment:** Consider other cleaner alternatives.

.....  
**Commentor:** Colin Bulthanp

**Comment:** One way or another, irregardless of whether the government decides upon above or below ground storage, it is necessary that the government keep its options open, maintain observations of the materials, and continue further research.

.....  
**Commentor:** Scott Hurd

**Comment:** No dirty closure, consider other alternatives. Thanks.

.....  
**Commentor:** Colleen Murphy

**Comment:** Please consider avoiding a dirty closure - Low-level nuclear waste is still a hazardous waste! (especially in groundwater!!) Please consider safer alternatives.

.....  
**Commentor:** Rochelle A. Strider

**Comment:** Anything in the ground will eventually seep into the land - Don't do it - find alternatives.

.....  
**Commentor:** Elisabeth Shears

**Comment:** I am opposed to the proposed clean-up plans. Better and safer options need to be researched. We should look for the safest, not the cheapest solution.

.....  
**Commentor:** David Kline

**Comment:** Not enough of the range of options for the Solar Ponds has been explored. More like an EIS process needs to be undertaken in this potentially highly hazardous situation. Thank you for your attention to this critical matter.

.....  
**Commentor:** Jacqueline Gilbere

**Comment:** As an concerned citizen, I am very much opposed to this proposed "clean-up" plan and hope and expect any government to come up with an real solution!

.....  
**Commentor:** Kerri Griffin

**Comment:** Although you consider these effort to cleanup Rocky Flats, you fall short of a long-term goal to insure the safety of everyone near and around Rocky Flats. Please consider continuing funding for a long-term SOLUTION. If you do not act efficiently? effectively now, it will only become more of a problem. Please act now!

.....  
**Commentor:** Scott Babcock

**Comment:** I urge you to look into "disposing" of you radioactive waste in a more appropriate way. There needs to be an EIS prepared and more public involvement regarding the disposal of this waste. Thank you!

.....  
**Commentor:** Amber Johnson

**Comment:** Proposed cleanup doesn't sound good, needs another solution.

.....  
**Commentor:** John and Sarah Ostovich

**Comment:** We are against the current plan to cap the Solar Ponds. We suggest looking at other alternatives with the assistance of the community.

.....  
**Commentor:** Brian Ladd

**Comment:** Mr. Konozal: Please consider options for the closing and clean-up of the Solar Ponds that will preserve future site use options, enable accurate monitoring, and prevent or minimize the possibility of further soil and groundwater contamination. DOE's facilitation of public involvement in any reconsideration of Solar Pond closure options would also be appreciated.

.....  
**Commentor:** Yvonne Short

**Comment:** I would like to see a better, safer solution to this bad situation. I don't like the proposed "cleanup" as it doesn't actually clean the environment. They should take full responsibility for the restoration of the environment they pollute.

.....  
**Commentor:** John Garder

**Comment:** I request that you folks change your tactics regarding your currently proposed "solution" at Rocky Flats. That's not cleanup. I suggest you rethink the length that these wastes will last and pose a danger to public health. Can you comprehend?

.....  
**Commentor:** Olga Sena

**Comment:** No dirty closure!

.....  
**Commentor:** Dan Vitaletti

**Comment:** Consider other cleanup methods.

.....  
**Commentor:** Brian Robert Kroll

**Comment:** As a Boulder county citizen, I am extremely concerned with the negligent and seemingly uncaring attitude of the Rocky Flats DOE Branch. Denver area residents (and all people) deserve to live in a radiation free environment. I personally did not ask for Rocky Flats, nor do I or have I ever benefited from its presence. As an American citizen, I demand that a serious effort be made to clean it up, not cover it up!

.....  
**Commentor:** David A. Cohen

**Comment:** Please consider all state-of-the art alternatives.

.....  
**Commentor:** Scott Lewis

**Comment:** Clean it all up, sealed please.  
.....

**Commentor:** Rita Cowanaugh

**Comment:** Consider alternatives.  
.....

**Commentor:** Leslie Peretsky

**Comment:** I don't believe its a viable option to use Solar Ponds. The cause and effect of such a proposal is beyond belief and so obviously unethical and I'm sure you could think up a better idea than this.  
.....

**Commentor:** Tom Altreater

**Comment:** This is a plan which was flawed the first time and more thought should be put into any plan. This is too short-term.  
.....

**Commentor:** Valerie Berg

**Comment:** Please take time to consider the appropriate effective action to take re: cleanup of the Solar Ponds. Please do not rush into ineffective handlings that won't actually contain the hazardous wastes. Thank you.  
.....

**Commentor:** Cecelia Jacobs

**Comment:** As a citizen who lives near Rocky Flats I insist that the cleanup there be thorough - not "dirty". We are fouling our nest - our children's children deserve a clean home.  
.....

**Commentor:** Alan McAllister

**Comment:** I am highly concerned with the current plan for capping the Solar Ponds. Not only does it not appear to properly project the underlying groundwater, but it effectively makes it harder to do anything better with these wastes in the future. It is also a question whether concrete caps will/are much better than the "pondcrete" blocks, and seems unlikely to be a true 1,000 year solution. I would favor a wider study of alternatives with proper reviews for public input.

.....  
**Commentor:** Debra Lyn Agee

**Comment:** Options should be preserved for future generation. The public should have a greater say in what happens.

.....  
**Commentor:** Tim Mason

**Comment:** It's my opinion that a "dirty closure" is not an alternative to a proper clean-up. Some form of proper storage should be used until this can happen. Thank you.

.....  
**Commentor:** Myriem Radjef-Jenatton

**Comment:** Dirty closure does not appear to be a well-conceived thorough solution to waste disposal at Rocky Flats. I support a more researched and permanent clean-up effort. Thank you for your efforts.

.....  
**Commentor:** C. K. Wootin

**Comment:** I am opposed to the dirty closure of the Solar Ponds. "Capping" the ponds which are already leaking, thereby contaminating the surrounding soil is not a viable solution. The DOE should formulate a comprehensive plan for storing waste at the entire site.

.....  
**Commentor:** Keun Lee

**Comment:** Many past "acceptable" solutions like the proposed one turned out bad. Considering the rapid population growth in this area, a more comprehensive and permanent plan is needed (with public participation).

.....  
**Commentor:** Patty Hakala

**Comment:** Please clean-up your mess, don't sweep it under the rug!

.....  
**Commentor:** Josh Radner

**Comment:** The solar pond "clean-up" sounds like a hasty and poorly thought out plan. Please give it more study and forums for public input.

**Commentor:** Stephen M. Perry

**Comment:** The ponds are an inadequate solution. Better technology to process and store long-term must be done.

.....  
**Commentor:** Dory Hacker

**Comment:** I ask of Rocky Flats to set a higher precedent for cleanup at Rocky Flats. Our earth and respect for our earth is essential for the survival of all species. Please be more intelligent and sensitive in your decision making.

.....  
**Commentor:** George Blakey

**Comment:** Converting the Solar Pond to a long-term waste landfill is not a site clean-up and is a terrible idea. We want Rocky Flats cleaned up completely, not changed to a dump site. This proposed plan is obviously short-sighted economics at work. Do the job the best way, not the cheapest.

.....  
**Commentor:** Chris Malley

**Comment:** Please do not settle on a "dirty closure" of OU4. We don't need a hazardous waste landfill so close to a growing community of millions, and it sets a bad precedent for future cleanup of Rocky Flats.

.....  
**Commentor:** Ben Thomas

**Comment:** The proposed clean-up is totally inappropriate. It creates a low-level radioactive and hazardous waste dump. An Environmental Impact Statement should be mandatory.

.....  
**Commentor:** Claire Kraft

**Comment:** To try and cover radioactive waste, and integrate it into the earth makes no sense whatsoever. The problem will by no means be solved; it will simply spread. Therefore, the long-term costs will fully outweigh those of the short-term. More hearings should be held on "dirty" closure.

.....  
**Commentor:** Carolyn Kancain

**Comment:** Dirty closure of the Solar Ponds is not clean-up. It will create a radioactive, and hazardous waste dump. An onsite above-ground storage of waste should be considered until a rational solution to nuclear waste is found. An Environmental Impact Statement should be conducted and the public involved. We need to look out for the health of current and future generations. Thanks.

.....  
**Commentor:** David J. Mittelstadt

**Comment:** Rocky Flats is an environmental problem specifically for Denver. It is necessary for us to do as much as possible to protect the environment and people of the area, from mere radiation. Dirty closure of the Solar Ponds will only increase the problems we have. It is important that we maintain a "no-dirty-closure" position for Rocky Flats.

.....  
**Commentor:** Brian K. Smith

**Comment:** Your problems are this has already contaminated the local ground supply. Also, with Arvada, other cities and developments growing in the area, it doesn't make sense to allow a toxic waste landfill in the area.

**Commentor:** John R. Gavin

**Comment:** I do not believe that the Solar Ponds would be an appropriate step in the clean-up process of radioactive material. It would only serve as a temporary and expensive solution - that has not been proven to be safe or effective. I think that a more permanent/safe solution needs to be found in order to keep the environment clean and safe for today and the future. Thanks.

.....  
**Commentor:** Liz Samworth

**Comment:** Dirty closure of the Solar Ponds is not cleanup. It creates a low-level of radioactive and hazardous waste. Please do not increase the gnarly pollution in our community!!!

.....  
**Commentor:** Jennifer Hill

**Comment:** As a Colorado resident and Rocky Flats neighbor I do not find it appropriate to have a "low-level radioactive hazardous waste landfill near the city I live in. This is not a cleanup it is an atrocity!!



.....  
**Commentor:** Evan Perkins

**Comment:** The very idea of storing radioactive waste in "Solar Ponds" is ludicrous. No matter how the ponds are lined, leakage is inevitable, and the damage to the surrounding soil and the under table, and the subsequent damage to us, is NOT WORTH IT. There are safer, be they more expensive alternatives.

.....  
**Commentor:** Ian Greer

**Comment:** As a long time resident near Rocky Flats, I feel it is my duty to urge you to conduct a FULL Environmental Impact Statement that is as inclusive of alternatives to landfills and "dirty closures". The long-term dangers of plutonium and uranium, as well as other hazardous materials stored at Rocky Flats are known enough for it to be apparent that the short sighted plans that are currently in favor are more than inadequate. It is your duty to ensure the public safety now and for future generations. Please live up to it.

.....  
**Commentor:** Mark Frey

**Comment:** "Dirty closure" is not cleanup. DOE should conduct a full EIS that considers the full range of alternatives for the Solar Ponds, namely onsite, above-ground, monitorable, retrievable state-of-the-art storage for wastes.

.....  
**Commentor:** Heather Bates

**Comment:** I do not agree with the dirty closure of the Solar Ponds. This is not an effective "cleanup", it creates a hazardous waste dump. I believe that an Environmental Impact Statement must be conducted and that the public should be involved.

.....  
**Commentor:** Janet Dreidis

**Comment:** Please consider utilizing the safest available technology when cleaning up the Rocky Flats Solar Ponds. I understand that it costs much more but uncontaminated groundwater is worth it. I understand an Environmental Impact Statement has yet to be done for the different alternatives. I urge you to do this immediately and then involve the public in decision making-as is right and proper.

.....  
**Commentor:** Julie K. Lewis

**Comment:** Dirty closure of the Solar Ponds is not clean-up! An Environmental Impact Statement should be conducted, and the public should be thoroughly involved. This is critical for the health of people all over Colorado and the United States as a whole.

**Commentor:** Nicholas Helburn

**Comment:** If toxic and radioactive wastes are to be buried and capped we need an Environmental Impact Statement. Until a thorough study is done, all these wastes should be stored above-ground where they can be monitored, where repairs can be made when needed.

.....

**Commentor:** Barret Burke

**Comment:** I am very concerned about the proposed methods of dealing with hazardous waste. Any "solutions" should be examined more closely with EISs. Public health and safety are of the greatest importance in dealing with the danger of such waste, and we should be made aware of all of the options, in addition to being a part of the decision making process. The long life of radioactive material demands more attention than Rocky Flats alone can give. Please be careful!

.....

**Commentor:** Christopher Hictsh

**Comment:** As a resident and concerned citizen near Rocky Flats, I'm opposed to the continuation of these dirty landfills. The DOE should conduct a full EIS and preserve options for site use for future generations whose health and safety is at stake here. A cheap economic option like these Solar Ponds are dangerous. Economic considerations should not drive the decisions that effect all of our health, safety and environment.

.....

**Commentor:** Donnie Digraw

**Comment:** I have lived in Colorado all of my life. I feel the public should be involved in the decision making process regarding these clean-up plans. Dirty closure is not clean-up nor is a landfill. All environmental impacts should be taken into consideration before a solution is approved.

.....

**Commentor:** Meg Seaman

**Comment:** I would like for you and your committee to store all toxic waste responsibly. An Environmental Impact Statement should be conducted and the public (reps of local action groups who are well informed) would be involved. The public health is in danger unless you consider the most extreme hazards and correct them.

## **Recommendation to the Department of Energy Regarding the Proposed Closure Plan for Operable Unit Four, The Solar Ponds**

*With full consensus of its membership, the Rocky Flats Citizens Advisory Board (CAB) makes the following recommendation:*

- CAB advises DOE that, if it chooses to use the proposed RCRA cap over the Solar Ponds at Rocky Flats, DOE should consider this project a means of providing interim containment and storage of the solar pond materials contaminated with low levels of hazardous waste and radionuclides.*
- CAB advises that monitoring be conducted indefinitely.*
- CAB is divided on whether DOE should include pondcrete and sludge in the solar pond closure.*
- CAB recommends that DOE have a design for groundwater remediation (phase 2) before beginning a closure of the Solar Ponds (phase 1).*
- CAB recommends that DOE develop a comprehensive monitoring plan before beginning closure (phase 1).*
- CAB recommends that DOE develop a plan to remove the solar pond cap and the contaminated materials under it before the planned conclusion of the interim period should it become necessary.*
- CAB recommends that DOE and the regulators be open to a better alternative proposal for solar pond closure should one arise.*

*Approved April 6, 1995*

---

**Rocky Flats Citizens Advisory Board, Inc.  
9035 Wadsworth Parkway, Suite 2250  
Westminster, CO 80021  
Phone: (303) 420-7855 Fax: (303) 420-7579**

## MEMORANDUM

Date: 16 March 1995

To: Tom Gallegos & Ken Korkia  
Environmental/Waste Management Committee  
Rocky Flats Citizens Advisory Board

From: Jim Burch

Subject: Comments on the proposed closure of the Solar Ponds at the RFETS (OU-4).

I will unfortunately be unable to attend the E/WM committee meeting this evening. The following is a summary of my comments and recommendations concerning the proposed solar ponds closure. They are based on the information package that was sent to CAB members and presentations made to the board, not a review of the IM/IRA documents.

1. The scope of this review process is well outside the limited capacity of CAB members or staff to adequately address given the voluminous and technical nature of the documents that have been generated. If the DOE and regulators are truly interested in CAB input, a technical reviewer(s) should be contracted by CAB with DOE funds to technically review and comment on the IM/IRA and consult with CAB members. Remember, there is an army of engineers and scientists working full time on the preparation and execution of this project for the DOE.

2. It is unclear why this project has been divided into two phases and why issues concerning remediation of contaminants in groundwater have been relegated to phase II. Based on information presented in EG&G's Well Evaluation Report (April, 1994), there is a significant amount of groundwater contamination underlying the solar ponds, including radionuclides as well as volatile organic compounds. Has the DOE addressed how the phase I landfill design will impact the evaluation and selection of remedial alternatives for groundwater? For example, will the presence of a landfill preclude the construction of a groundwater treatment facility above the area where the aquifer is most contaminated at OU-4? How will future plume mapping be performed at OU-4 if a landfill is present?

3. What will happen to the groundwater contaminant plume in the time it takes to complete phase I? It appears that vital time will be lost and that significant contaminant migration will continue to occur in groundwater. The DOE and regulatory agencies should re-evaluate whether groundwater remediation should be separated from surface and subsurface soil remediation

at the solar ponds and what the impacts of such a decision will be on groundwater treatment alternatives.

4. It is of great concern that the landfill is designed to leak from below. This, in my opinion, is a serious design flaw. In effect, source isolation has not been achieved and the design must rely on secondary (as yet unspecified) treatment processes (to be developed in phase II) to detect, capture and treat contaminants that are released from below the landfill due to the rise and fall of the water table. This process of contaminant release is likely to be in place after 30 years of post-closure monitoring and may be in place for the landfill's entire 1000 year life span. Thus, the groundwater detection, capture and treatment processes must be operational for the same amount of time. What will be the costs associated with this? Are the estimated costs for this alternative underestimated? This re-emphasizes the point about combining the remedial design for the groundwater with the landfill design. The DOE should consider an impermeable lower lining to achieve complete source isolation.

5. What is the nature and extent of contamination that will remain untreated below the landfill once it is in place? Won't this contamination remain a source of groundwater contamination due to leaching and groundwater transport? What are the risks associated with the contaminants that will remain untreated in subsurface soils below the landfill? What is the plan for remediation of subsurface soils surrounding the landfill and how will installation of the landfill impact the design of remedial alternatives for this contamination?

6. The "Risk Determination Fact Sheet" for OU-4 provided in the CAB information packet provided by our staff indicates that there are significant risks associated with surface soil contamination and that surface soil contaminant concentrations will not exceed the preliminary remediation goals (PRGs) following remediation. Why are preliminary cleanup levels being proposed apparently without more detailed evaluation of health risks? Research on the potential migration of plutonium in the soil column suggests that it tends to be relatively immobile. How does this effect the potential for plant uptake and ingestion of garden vegetables by hypothetical future residents? What are the future risks associated with groundwater ingestion at OU-4? What are the risks to hypothetical residents or workers at OU-4 that are due to contamination at adjacent OUs (e.g., surface soil radionuclides east of the 903 pad)? How do the risks associated with the above or other potential exposure pathways affect the PRGs that have been calculated? If additive health effects are assumed, doesn't the exclusion of PCOCs that were detected in surface soils at concentrations below the PRGs result in an underestimate of the potential health risk? If the PRGs are to be used as cleanup levels, do they take additive effects into

account? What plan is in place to ensure that the cleanup level that is chosen for surface soils is achieved? For example, will post-cleanup surface soil samples be collected? How many? Will a statistical sampling design be implemented? How will the planned excavation of the ponds impact this process? Will soil sampling be performed to ensure that surface soils were not contaminated by the remediation process?

7. How does this remedial decision affect future groundwater use (either commercial, agricultural or residential)?



OU4 IM/IRA - EA (Solar Pond Closure) Comments

To: U.S. Department of Energy, U.S. Environmental Protection Agency, Colorado Department of Public Health and the Environment  
From: Tom Marshall, Rocky Mountain Peace Center  
Date: 4/11/95

Thank you for the opportunity to comment on the Operable Unit 4 Interim Measure/Interim Remedial Action - Environmental Assessment Decision Document (OU4 IM/IRA - EA). It is evident that the agencies responsible for the IM/IRA - EA have put much thought, effort, technical expertise, and time into the decision document. They are to be commended for their efforts. Nevertheless, the proposed closure action for the Solar Ponds is fundamentally flawed in that it provides a technical "fix" in the absence of a supporting / comprehensive policy position.

Cleanup is just beginning at Rocky Flats. The closure of the Solar Ponds is one of the first major cleanup actions. It is important that the course taken with this "cleanup" be one that we can all live with, for it will likely set a precedent for further "cleanup" of the site. Following is a summary of problems with the Solar Pond closure proposal, and an alternative proposal. These comments are not exhaustive. Rather, they attempt to point out basic flaws and concerns, and point toward a more rational decision making process that will facilitate cleanup of cleanup of OU4, and the rest of the site.

PROBLEMS WITH THE PROPOSED SOLAR POND CLOSURE

- 1) "Dirty Closure" of the Solar Ponds sets a bad precedent for future cleanup at Rocky Flats.
- 2) The proposed closure would create a de facto low level radioactive and hazardous waste dump.



-2-

- 3) This closure would have to remain stable for at least one thousand years, even though some of the contaminants of concern will remain dangerous far longer than that. This is a long time for an engineered closure to remain safe.
- 4) The risk assesment does not consider the possibility of human intrusion in all scenarios.
- 5) This closure proposal is both a RCRA and a NEPA document. Under NEPA all reasonable alternatives must be considered. Yet the full range of alternatives, including above ground storage, was not considered.
- 6) It does not appear that DOE has a comprehensive plan for managing wastes that accrue from cleanup at Rocky Flats. This is evidenced by the recent proposal from CDPHE that there be a centralized low level radioactive waste landfill created on site, instead of a number of de facto low level radioactive dumps on site.
- 7) Perhaps the most troubling aspect of the Solar Pond closure has been the public participation, or rather, the lack of it. Evidently, the involved agencies have worked rather extensively with the E/WM Committee of the Citizens Advisory Board, and to some extent with the Technical Review Group. For this they should be commended. Nevertheless, this has in actuality been an extended review and comment exercise. DOE, EPA, and CDPHE developed a plan that they brought to some of the public and said "pretty good right"? Effective public involvement means involving the public at the front end of the process, in the conceptual phase. It is not merely "tweaking" proposals. The agencies have yet to ask the public "what should happen with waste at Rocky Flats? How clean is clean?" These are not easy questions, but they are essential questions, the answers to which are necessary in order to make rational, publicly acceptable decisions on cleanup and waste management.

#### BACKGROUND

At the Rocky Flats Summit the idea that some cleanup could be deferred in order to undertake mortgage reduction activities (as long as there is a binding commitment for DOE to come back to the cleanup) was widely accepted. DOE has indicated that it could utilize an extra \$35 million per year over the next two years in mortgage reduction activities. The current cleanup actions that are being considered for deferral are largely associated with the industrial area. The Solar Ponds will cost approximately \$35 million per year over the next two years.

-3-

PROPOSAL

DOE does not have a rational, publicly acceptable comprehensive plan for managing low level radioactive wastes. The Solar Pond closure initiates an ad hoc approach to cleanup and waste management that does not have full public acceptance. Money is needed now for "mortgage reduction" activities. For these reasons RMPC proposes:

That DOE defer action on the Solar Ponds for two years (providing that the groundwater contamination does not present an imminent threat).

That money from the Solar Ponds be put into mortgage reduction activities (with some money set aside to manage the sludge and pondcrete).

That there begin an immediate public dialogue aimed at answering the important questions of how clean is clean and what should be done with the waste. The CAB might convene such a dialogue.

That there be an environmental impact statement examining these questions - the Sitewide Environmental Impact Statement currently underway might suffice.

This effort would, speed cleanup in the long run (it will be easier to reach decisions with these questions answered), and free up money in the short run to perform needed mortgage reduction activities. It would also save money in the long run, as much money is now "lost" due to the lack of a rational, comprehensive plan for managing wastes on site (e.g. excessive costs for RCRA inspections because wastes are spread throughout the site, and excessive costs to heat pondcrete because it is in temporary tents). Thus, it can be seen that this effort would not delay cleanup in the long run. Further, it might be possible for the dialogue referenced above to be structured in such a way that cleanup and waste management plans are developed along with the dialogue.

It is our hope that these comments have been helpful. We hope that you will reconsider your current proposal for OU4. We would appreciate a response to our comments at your earliest convenience. Further, we would like to know how public comments will figure into the decision making process for the OU4 IM/IRA - EA

COLORADO CHAPTER

# PHYSICIANS FOR SOCIAL RESPONSIBILITY

The U.S. Affiliate of International Physicians for the Prevention of Nuclear War

Recipient of the 1985 NOBEL PEACE PRIZE

1738 Wynkoop, Suite 1, Denver, Colorado 80202 • (303) 298-8001

April 10, 1995

Harlen Ainscough

HWC-B2

Colorado Department of Public Health and Environment

4300 Cherry Creek Dr., South

Denver CO 80222

Re: OU4 IM/IRA Comments

Dear Mr. Ainscough:

Please accept the attached comments in regards to environmental restoration proposals concerning the solar ponds (Operable Unit 4) at Rocky Flats.

Sincerely,



Samuel H. Cole

Executive Director

Enclosure

- 2 -

A Comprehensive Waste Disposal Plan is Needed

It is improper for the DOE to be making decisions on waste disposal on an individual, ad hoc basis. Before the DOE decides to bury the solar pond waste, it must first develop a publicly acceptable and comprehensive plan for waste disposal and storage at Rocky Flats.

Recommendation

The DOE has not demonstrated an urgent need for the solar pond disposal site and this proposal is not part of an overall plan for waste disposal/storage at Rocky Flats. Therefore, a more rational approach would be:

- 1) Contain any dangerous waste still in the ponds along with the rest of the pond waste in an above ground, monitorable, retrievable, state-of-the-art storage facility. Money saved should go towards "mortgage reduction" activities.
- 2) Begin a public dialogue on how clean the site should be made and what is an acceptable waste disposal/storage solution. These questions should be addressed through an Environmental Impact Statement.

April 10, 1995

Comments by Samuel H. Cole, Executive Director of the Colorado Chapter of Physicians for Social Responsibility on Rocky Flats Solar Ponds IM/IRA

We oppose the current "cleanup" proposal set forth by the Department of Energy to bury waste at the pond site as this sets a dangerous precedent for future waste disposal practices at Rocky Flats. The proposal creates a de facto nuclear and hazardous waste dump, something the public is likely to reject as a cleanup option at Rocky Flats. The proposal should also be rejected on grounds that alternatives are not under consideration and the public's opinion was not solicited at the start of the conversation on this topic.

A Risk to Public Health and the Environment

Burying low level radioactive and hazardous waste on site does little to contain and protect the environment and the community from contaminated waste at Rocky Flats. In the short term waste disposed of in this fashion may be safe; however, in the longterm it is impossible for the DOE to guarantee the safety of this waste for as long as it remains dangerous. The fact that the water table sits in close proximity to the proposed burial site during certain parts of the year and that this site is also near an ever-expanding metropolitan area, it is highly imprudent to risk burying the waste.

Burial is Permanent Disposal

If the regulators and the DOE decide to make this disposal facility only a temporary location for the waste, it would be wise to reconsider the project entirely. Common sense would dictate that once waste is buried or begins leaking from the burial site it would be a lot more expensive and difficult to unearth and correct the contamination than if the waste had remained stored above ground in a monitorable, retrievable fashion. In other words, it makes no sense to bury waste that can be safely stored above ground.

An Environmental Impact Statement is Needed

The DOE has not considered a full range of alternatives for cleaning up OU4. Therefore, an Environmental Impact Statement that considers these alternatives should be preformed. Asking for public comment on one proposal without alternatives does not generate meaningful public participation.

PUBLIC COMMENTS  
IM/IRA-EA Decision Document

---

COMMENTS RECEIVED AT PUBLIC HEARING

**COMMENTOR:** Al Marshall

- COMMENT:**
1. I'd like to see more empirical data based on experimentation that has been done at other sites that contain similar kinds of contamination concern to demonstrate that the proposed scenarios do indeed work and that these scenarios indeed, as matter of fact, support the models that have been used to establish the plans for Rocky Flats.
  2. I'd like to see some data that supports the economics of comparing the proposed scenarios and the proposed contamination containment systems, I'll call the, against the recycling of tanks above-ground to contain the materials of concern.
  3. I'd also like to see some empirical data based on experimentation to support the concepts of producing concrete as a result of mixing these ingredients in the concrete cocktail, so to speak, to the extent that can be reasonable assurances that after a few years of exposure that these elements that are produced in the form of concrete do not begin to deteriorate and again produce a problem that has to be recycled.

**COMMENTOR:** Kenneth Werth

- COMMENT:**
1. I have some reservations about putting a cap on a nuclear waste dump in the middle of an industrial site.
  2. If the Project is estimated at \$108 million and the Department of Energy cuts the budget, for Rocky Flats cleanup, what happens if the budget runs over, say, by \$50 to \$100 million? Would they cut money from other projects that are on the agenda out there?
  3. What happens when a new contractor comes on the site and feels this is not a priority project?
  4. What happens if the new contractor has other innovative technology that he wants to employ for the solar pond site?
  5. How can you call this a 1,000-year cap when you are going to have to open the cap after 30 years to retrieve sensors that have been implanted at the bottom of the cap for monitoring.
  6. If we are to believe Rocky Flats management on a 1,000-year cap that would cleanup the Solar Pond site, how do you explain the 70 containers of 10,000 gallons to each container and what do you propose to doing with the sludge that's out there?

.....  
7. How are you going to put safeguards on the cap against terrorists or  
undesirable groups that have a kind of agenda to blow it up or something  
like that?  
.....

8. I do not believe the method of placing a cap on the solar pond waste,  
pondcrete, pond sludge and site debates and miscellaneous will solve the  
leaching of groundwater during a heavy rainstorm or flood into the  
environment that's going to be set up for 1,000 years.